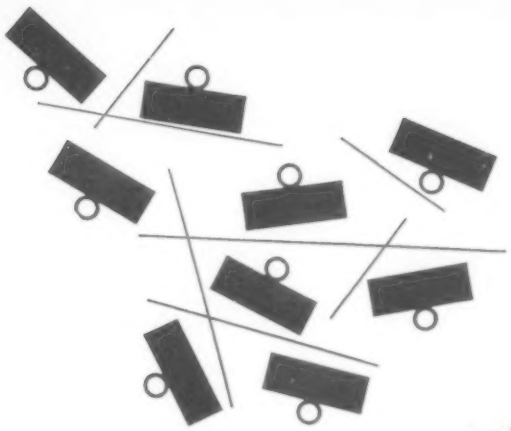
McGRAW-HILL INTERNATIONAL

Management Digest

TECHNICAL • INDUSTRIAL • COMMERCIAL

AUGUST 1956

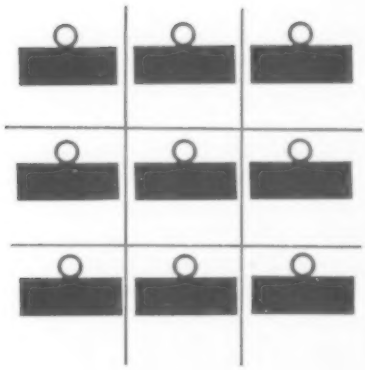
OVERSEAS EDITION

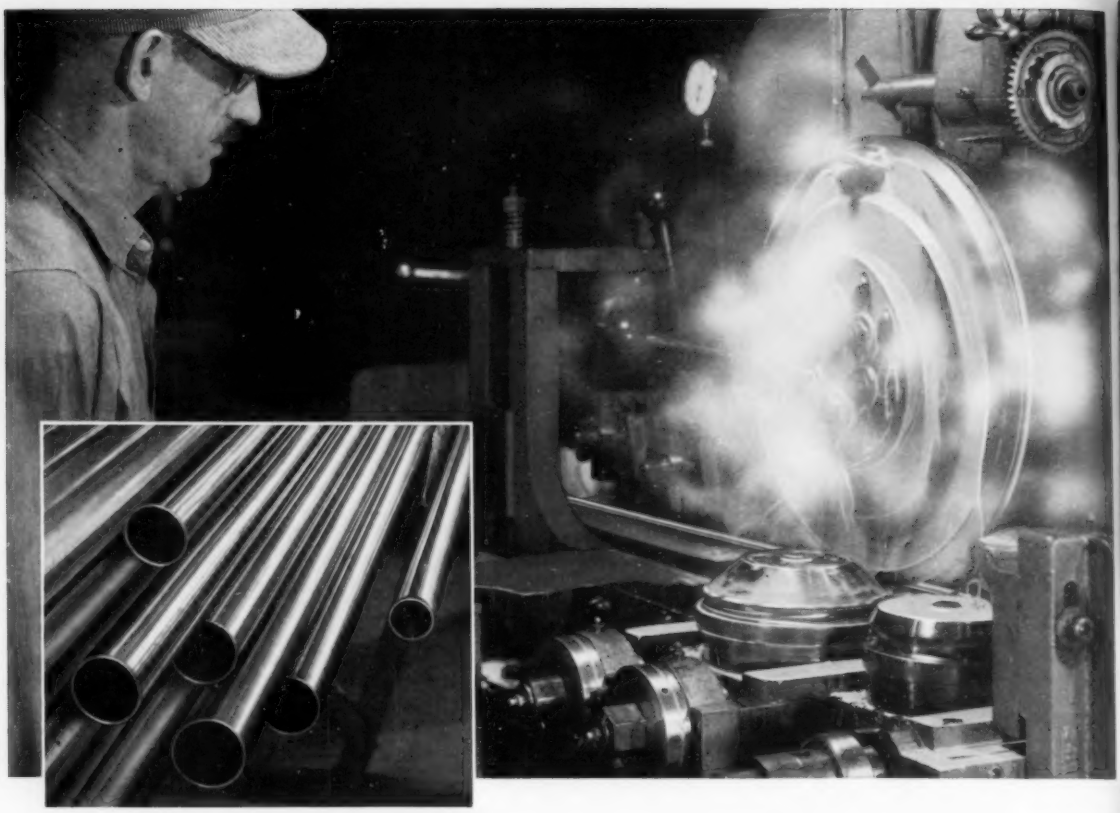


REPORT TO MANAGEMENT: PAGE 43

ORGANIZATION

a new approach
to office efficiency
...costs, personnel,
methods, machines





IN ELECTRIC-WELD PIPE AND TUBE MAKING

Yoder leads the way

to higher speeds and quality at lower cost

In the short period from 1938 to 1955, the production of electric welded pipe and tubing grew from 269,000 tons to over 3,000,000 tons. This phenomenal rate of growth—over two and one-half times faster than that of the pipe and tube making industry as a whole—to a large extent resulted from a series of important improvements in tube mill design, all introduced by Yoder.

First came the Yoder rotating welding transformer, in 1938. The economic and other benefits conferred by this epoch making innovation were further augmented by other technological advances scored by Yoder in the years that followed. The result was that electric-weld pipe and tube making became the child prodigy of the fast growing pipe and tube making industry.

Latest, and perhaps the greatest, of these developments is the cold forming and induction welding at high speeds of *aluminum, magnesium, brass, nickel, monel, and other non-ferrous metals and alloys.* This process is especially economical for making light and medium gauge tubes in sizes up to 8 in. dia. More and more leading non-ferrous metal producers and fabricators are installing these mills.

More complete information about this and other interesting Yoder developments in pipe and tube mill equipment may be had merely by asking for any of the following publications:

- ☐ Resistance-Weld Mills for making Steel Tubing up to 4" diameter.
- ☐ Induction-Weld Mills for making Non-ferrous Tubing.
- ☐ Resistance-Weld Mills for Steel Pipe up to 24" diameter.

THE YODER COMPANY

5517 Walworth Avenue **Cleveland 2, Ohio**

ENGINEERING YODER MANUFACTURING

PIPE AND TUBE MILLS—Electric Weld

ROTARY SLITTING LINES

COLD ROLL FORMING MACHINES

Allis-Chalmers earth-moving equipment is shown here working on a large construction project. Included in the picture are a tractor equipped with a bulldozer, a motor grader, and five giant TS-360 motor scrapers . . . all diesel powered.

for BIG earth-moving projects

Development programs of many kinds are in progress throughout the world. New roads, dams, airports, housing developments, schools, hospitals, and other construction projects are keys to greater national prosperity.

Such activities require the moving of tremendous amounts of earth . . . quickly and economically. To meet this need, Allis-Chalmers offers a line of earth-moving equipment in a wide range of models and sizes including diesel crawler tractors, tractor shovels, motor graders, and giant self-propelled motor scrapers. The TS-360 scraper, for example, can load 20 cubic yards of earth weighing up to 25 tons, then haul, dump, or spread it as desired, and return at speeds up to 20 miles per hour.

Modern equipment of this type advances the completion of public tax-financed or private projects, and assures utmost economy in all phases of such operations.

ALLIS-CHALMERS, EXPORT DEPARTMENT MD856
TRACTOR DIVISION, MILWAUKEE 1, U.S.A.

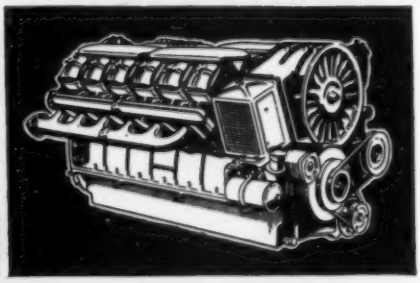
ALLIS-CHALMERS

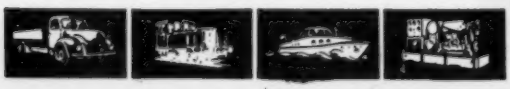
BUILDERS OF MACHINERY SINCE 1847

Model HD-21 diesel crawler tractor equipped with a bulldozer preparing a site for a large housing project in Venezuela.

air-cooled

began in 1948 to build air-cooled diesel engines in large series. 7 years after, in 1955, the oldest engine manufacturers in the world had built and sold 150.000 air-cooled DEUTZ diesel engines totalling 7.5 Million B.H.P. These equipment engines are used all over the world for every kind of application. DEUTZ builds air-cooled 1 to 12-cylinder diesel engines with an output range from 5 to 250 B.H.P. for road vehicles, rail vehicles, water craft, working machines in all fields of application, generator sets for stationary and mobile electric and power plants.





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GERMANY

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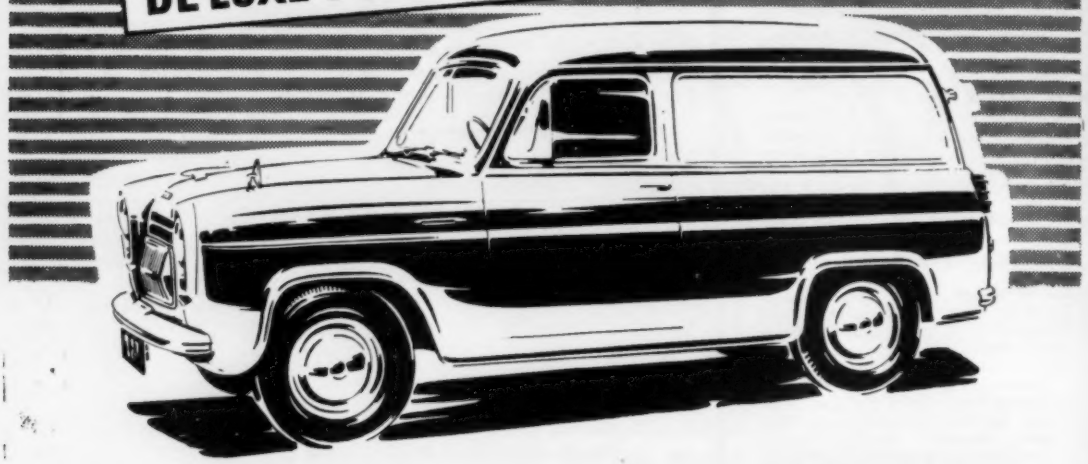
THAMES

DE LUXE 7 cwt. (350 k.g.) and ¼ TON vans



NEW LOOK FOR *NEW* PROFITS

The New Thames de Luxe 7 cwt. (350 k.g.) Van has an air of quality—a new look that adds prestige to any business. With extra load capacity, smooth all-steel body and in-built British quality, the new Thames de Luxe 7 cwt. (350 k.g.) Van scores on *all* these extra points, too . . .

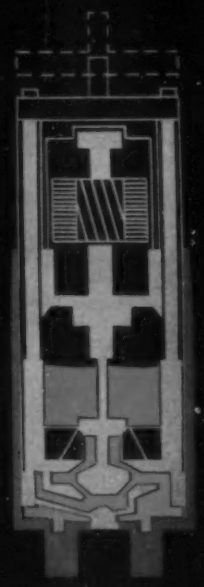
- **EXTRA STRENGTH REAR SPRINGS**
- **LEVER TYPE DOUBLE-ACTING REAR SHOCK ABSORBERS**
- **TWIN WINDSCREEN WIPERS**
- **CHROMIUM PLATED FRONT & REAR BUMPERS & HEADLAMP SURROUNDS**
- **DISTINCTIVE RADIATOR GRILLE**
- **SEE YOUR FORD DEALER FOR FULL DETAILS**

for the smaller load the smaller Van—the Thames ¼ Ton (250 k.g.) Van. Same wonderful value . . . same superb performance.

. . . and World-Wide service too!

ASK YOUR DEALER about the rest of the famous range of Thames Commercial Vehicles, the standard 7 cwt. (350 k.g.) Van and the brilliant ½ ton Van, tested and proved over millions of miles. The 1½, 2, 3 and 4 ton Trucks fitted with the outstanding DAGENHAM-BUILT DIESEL ENGINE or the 'Cost-Cutter' Petrol Engine . . . and the 5 ton models with choice of the powerful, economical 85 b.h.p. V.8 Engine or the famous P.6 Diesel.

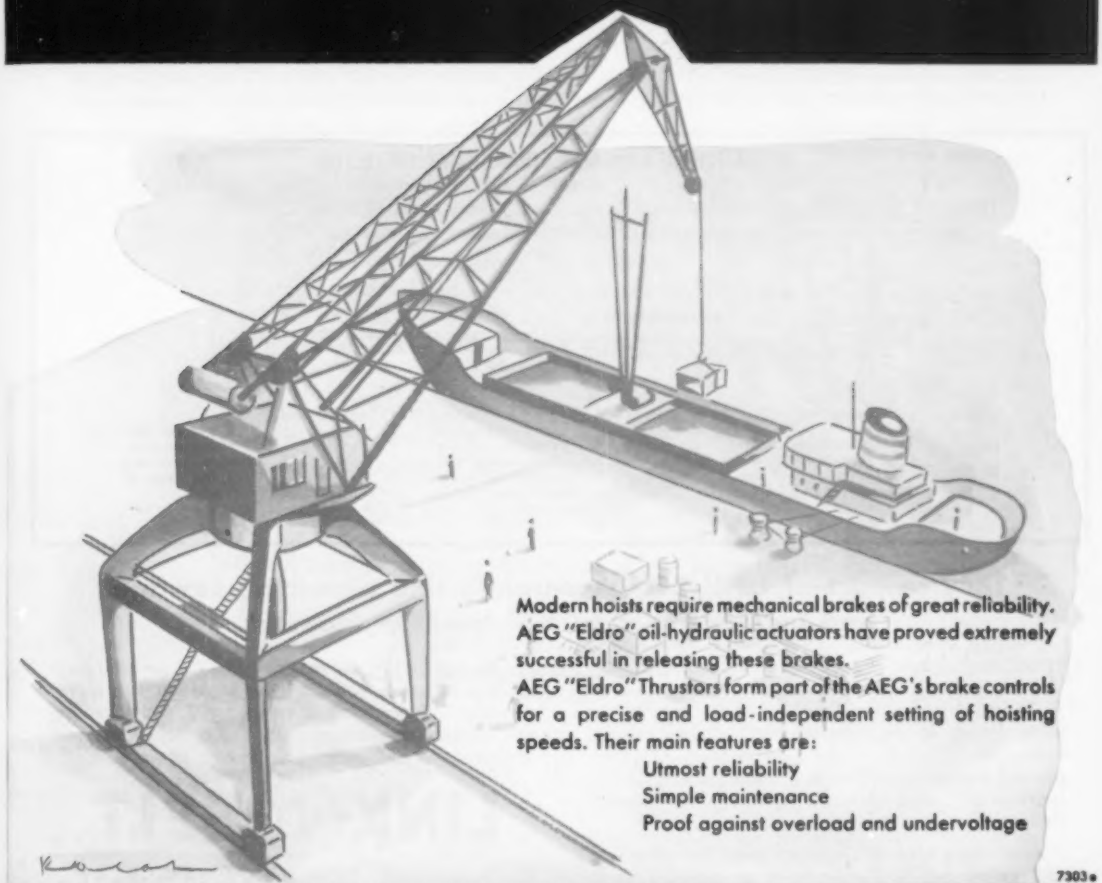
PRODUCTS OF FORD ENGLAND MOTOR COMPANY LTD



AEG

Electrical Equipment for Hoists

Section through an "Eldro" Thrustor



Modern hoists require mechanical brakes of great reliability. AEG "Eldro" oil-hydraulic actuators have proved extremely successful in releasing these brakes.

AEG "Eldro" Thrustors form part of the AEG's brake controls for a precise and load-independent setting of hoisting speeds. Their main features are:

Utmost reliability
Simple maintenance
Proof against overload and undervoltage

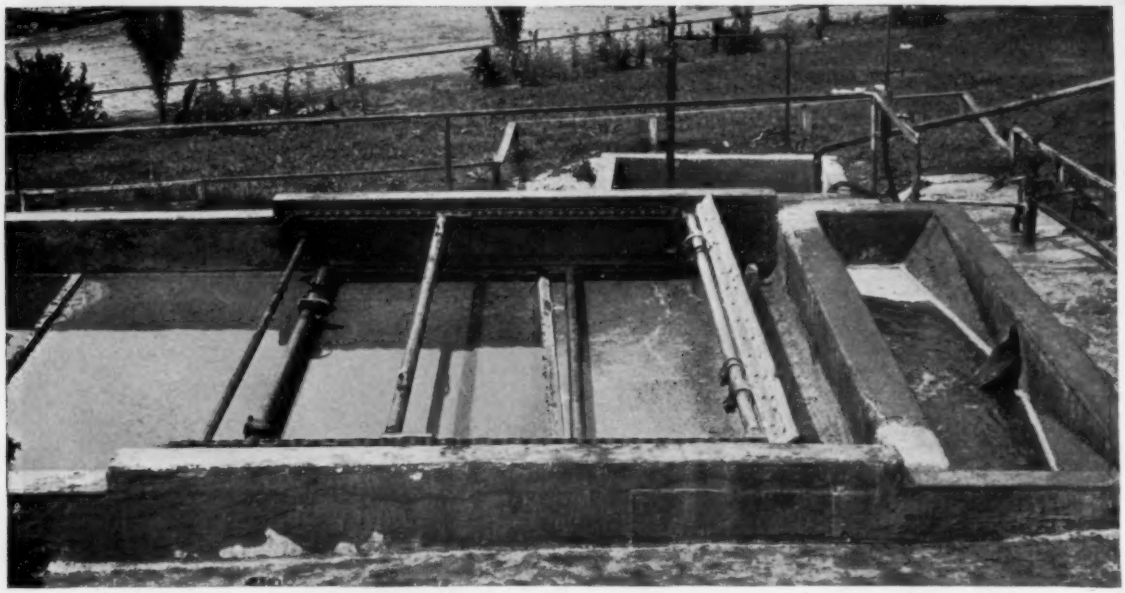
7303e

ALLGEMEINE ELEKTRICITÄTS-GESELLSCHAFT

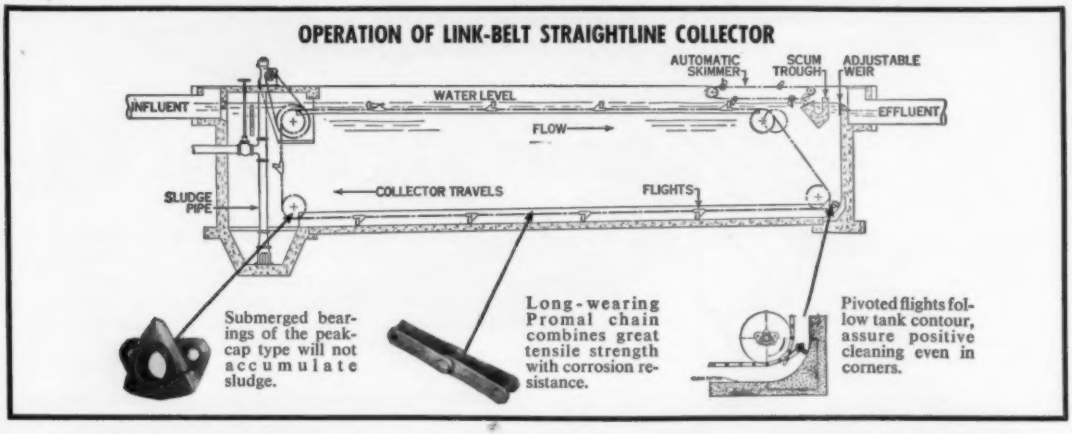
Berlin (West) EXPORT DEPARTMENT Frankfurt (Main)

For top-speed removal of sludge, grease and scum . . . industries and municipalities

choose Straightline Collectors



Action of Straightline collectors installed at Utinga plant of Companhia Swift do Brasil provides shortest possible travel of collected grease, scum and sludge at slow, uniform speed. Result: minimum disturbance of flow and maximum collecting capacity.



They're part of LINK-BELT's complete line of water, sewage and industrial waste treatment equipment

THE effectiveness of Straightline action makes this Link-Belt collector design one of the most preferred in the industry. And the same high quality is built into all equipment in this complete line—screens, mixers, conveyors and power transmission products. All incorporate Link-Belt components, including drives, chains, bearings . . . have earned a reputation for uninterrupted operation with minimum attention.

In addition, Link-Belt sanitary specialists offer long and varied technical experience in applying these products. If you're planning new facilities or enlarging existing capacity, find out how Link-Belt can serve you. Our engineers will work with you, your chemist and consultants—combine top efficiency with low maintenance. Call your representative, or write direct.

LINK-BELT

SANITARY ENGINEERING EQUIPMENT 14.049

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EXPORT DIVISION: 2680 Woolworth Bldg., New York 7, U.S.A., Cable Address: Linkbelt—New York • Representatives Throughout the World.

WORLD TRENDS

IN THE U.S.A.

American exports, reports one economist, must increase four or five times within 20 years if the nation is to pay for the imports it will need. The total in 1976 might be $60,000-million to $75,000-million worth of exports.

Another expert notes the rising trend of private, direct U.S. investment in other nations, and the sales of U.S.-controlled businesses overseas that such investment generates. American "foreign sales"—not including exports from the U.S.A. itself—have increased 40% since 1950. That is a conservative estimate, since investment has increased 60%.

By 1960, these "foreign sales" may be $40,000-million, compared to $30,000-million today.

So far this year, U.S. foreign commerce has established new records. Exports of goods and services in the first three months rose to $5,300-million, imports jumped to $4,800-million. During that period, other nations added $557-million to their gold and dollar reserves. Americans regard this as a healthy sign for world trade.

Look for American foreign trade to continue at high levels through the coming months. Despite uneasiness in the domestic business scene, a record year for U. S. trade is in prospect.

The U.S. business outlook has been complicated by politics, by a steel strike, and by the President's second major illness.

Businessmen have been worrying about weak spots in the economy—low auto production, rising inventories, falling farm prices. The central bankers of the Federal Reserve System have feared inflation—yet they increased the supply of credit in June. Then, as MANAGEMENT DIGEST went to press, came a national steel strike—with its generally inflationary impact—to further complicate the outlook.

Most observers have expected a down-trend during the third quarter. But they look for a strong fourth quarter, and good business in 1957. Industry's capital expansion plans are ambitious; employment and savings are high; consumers continue to buy at a fast rate.

This is an election year in the U.S.A. That, plus worry over Eisenhower's health, causes a slowdown. Remember, when you assess U.S. prospects, that politicians make much of even minor business readjustments in their effort to win. And important legislation—such as that covering foreign trade policy (Page 15)—suffers in the political excitement.

One American industry feels optimistic as never before. Two years ago, coal was a "sick" business. Now the energy needs of an expanding economy have created a big demand for coal.

Coal exports are booming. Europeans estimate that by 1960 they will need 44-million tons of U.S. coal, compared to the 27-million tons purchased last year. European industrialists have signed long term purchase contracts in the U.S., and have even tried to buy U.S. coal mines. Now the American coal industry, the miners' union, and the railroads talk of setting up a $50-million shipping corporation—to haul coal abroad.

OUTLOOK FOR SHIPS

Shipbuilding in the next 10 years will thrive on oil, not coal. According to a report by *The Economist* of London, oceangoing tankers will pro-

Turn the page for more WORLD TRENDS

vide about 65% of the business for shipyards throughout the whole world.

Refrigerator ships, ore carriers, colliers, other specialized vessels will be in demand. But generally, dry cargo and passenger ships will be needed only as replacements for present tonnage.

International trade and shipbuilding are linked closely. Seaborne shipments, accounting for nearly 70% of all commerce, has grown right along with world trade. But the growth has been lopsided—almost all in the transport of oil.

In the past 25 years, ocean oil shipments have jumped from 13% of all sea trade to 45%. And the world's fast-rising appetite for oil promises even greater tonnages for the tankers.

This means, reports *The Economist*, that tanker tonnage would have to rise by 5% to 8% yearly—from 27-million gross registered tons now to as much as 57-million tons in 1965. But dry cargo tonnage—now 71-million tons—will increase hardly at all.

Shipbuilders, and all the industries serving them, can look forward to a 10-year total business of (1) perhaps 16-million tons of dry cargo replacements; and (2) roughly 20-million to 40-million tons of new tankers.

As if to add emphasis to this forecast, the Japanese this month are launching the world's largest ship at Kure—83,000 deadweight tons.

It is another oil tanker. And a sister ship will be laid down right after the launching.

PROGRESS IN JAPAN

Note the impressive economic performance of Japan—in more areas than just shipbuilding. It is an example of what a nation can do if it has the courage to take unpopular action.

Japanese business was in bad condition once the "boom" days of the Korean War were over. Exports were high-priced; gold reserves were dwindling; inflation threatening. Then these things happened:

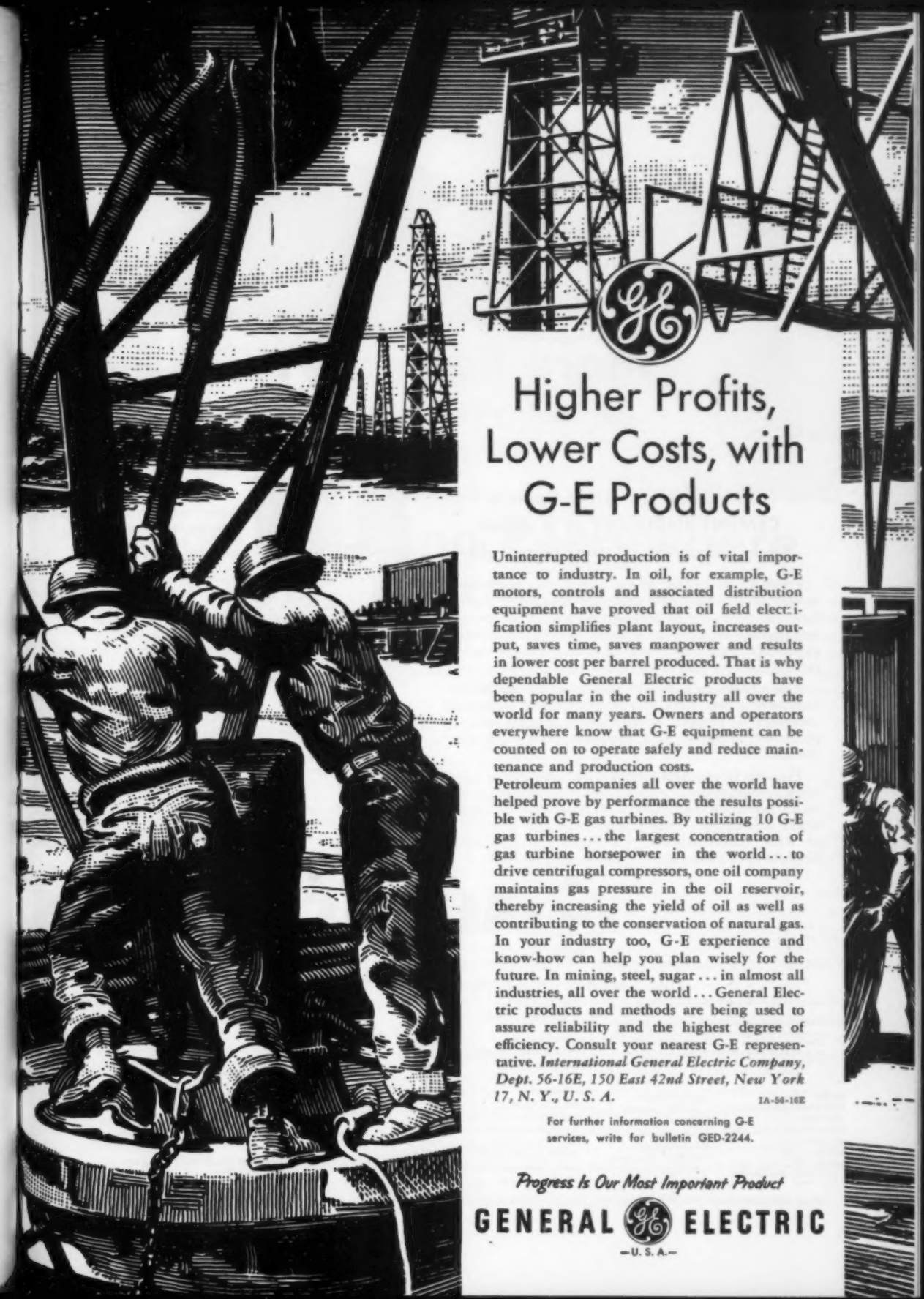
- Credit was curbed—drastically. Thousands of businesses opened during the prosperous Korean War days closed. Rising unemployment tended to keep down wages—just as wages in most other industrial nations began to increase.
- New investment was discouraged, but modernization was not. The emphasis was on cost-cutting, new processes, more efficiency. Costs and prices—including some export prices—declined.
- Japan managed to diversify both its export products, and its export customers. That, plus, rising world trade, has brought Japanese exports to record levels, and gold and foreign currency reserves to the highest point since World War II. More than ever, Japan is a keen competitor in the world market place.

Japan's problems are still staggering. There are some 90-million people, pressing on a small land area. About 700,000 new workers enter the labor force each year. Scarcity of resources, an increasing dependence on imports, present a serious challenge for the future.

LONELY LABOR

In the midst of the British debate on "automation" (MD, July), a new wage demand was presented by workers who expect to see their lives changed by new automatic techniques. It was not from men who fear machines will replace them. Instead, it came from those who thought they would remain after the machines go to work.

What do they want? Extra "lonely pay"—to compensate for losing the companionship of nearby workers in the the plant.



Higher Profits, Lower Costs, with G-E Products

Uninterrupted production is of vital importance to industry. In oil, for example, G-E motors, controls and associated distribution equipment have proved that oil field electrification simplifies plant layout, increases output, saves time, saves manpower and results in lower cost per barrel produced. That is why dependable General Electric products have been popular in the oil industry all over the world for many years. Owners and operators everywhere know that G-E equipment can be counted on to operate safely and reduce maintenance and production costs.

Petroleum companies all over the world have helped prove by performance the results possible with G-E gas turbines. By utilizing 10 G-E gas turbines ... the largest concentration of gas turbine horsepower in the world ... to drive centrifugal compressors, one oil company maintains gas pressure in the oil reservoir, thereby increasing the yield of oil as well as contributing to the conservation of natural gas. In your industry too, G-E experience and know-how can help you plan wisely for the future. In mining, steel, sugar ... in almost all industries, all over the world ... General Electric products and methods are being used to assure reliability and the highest degree of efficiency. Consult your nearest G-E representative. *International General Electric Company, Dept. 56-16E, 150 East 42nd Street, New York 17, N. Y., U. S. A.*

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For further information concerning G-E services, write for bulletin GED-2244.

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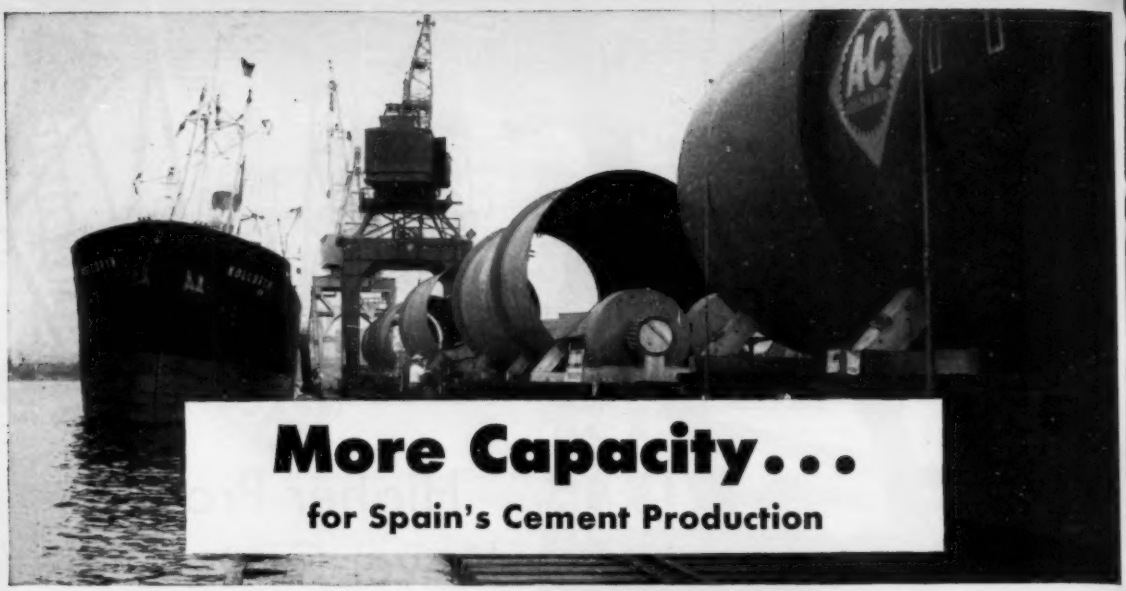
GENERAL ELECTRIC

—U. S. A.—



More Capacity...

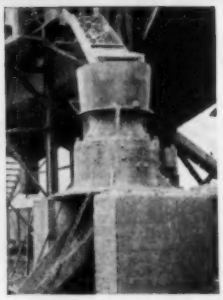
for Spain's Cement Production

Allis-Chalmers serves Spain's CEMENT INDUSTRY as it serves basic industries all over the world

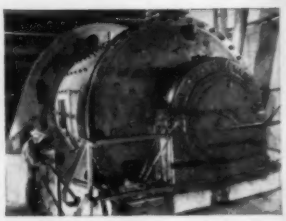
Photo shows another Allis-Chalmers rotary kiln being loaded at the Port of Milwaukee for one of Spain's foremost producers of Portland cement. This new unit was selected on the basis of many years of satisfactory experience with other Allis-Chalmers cement-making equipment now operating in the same plants.

Allis-Chalmers can furnish the application knowledge, engineering teamwork and manufacturing experience necessary to properly coordinate equipment into the profitable operation of a complete plant or a small installation.

Through license agreements with outstanding world firms, certain types of Allis-Chalmers equipment is now being manufactured abroad for purchase in leading world currencies. Contact your local A-C distributor or write Allis-Chalmers, Industries Group, Export Department, Milwaukee 1, Wisconsin, U. S. A.



***HYDROCONE* GYRATORY CRUSHERS** like this are widely used for crushing of limestones and aggregates. Allis-Chalmers crushers are also used all over the world for crushing hard, abrasive rock and metallic ores.



GRINDING MILLS built by Allis-Chalmers are used for raw and finished grinding in cement plants, and for grinding metallic ores, chemical products and other materials in a variety of industries. Only Allis-Chalmers builds mills as well as motor, drive and control.

Texrope and *Hydrocone* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

50658

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BELGIUM—Brussels.
BOLIVIA—La Paz.
BRAZIL—Rio de Janeiro, São Paulo, Recife (Pernambuco), Porto Alegre.
BRITISH BORNEO—Sandakan, Jesselton.
BURMA—Rangoon.
CANADA—Montreal.
CHILE—Santiago.
COLOMBIA—Barranquilla, Bogotá, Medellin, Cali.
COSTA RICA—San José.
CUBA—Havana.
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REPUBLIC OF THE PHILIPPINES—Bacalod City, Cebú, Manila, Negros Occidental.
SARAWAK—Kuching, Sibu, Miri.
SINGAPORE—Singapore.
SOUTH AFRICA—Johannesburg.
SPAIN—Madrid.
SURINAM—Nieuw-Nickerie, Paramaribo.
SWEDEN—Stockholm.
TAIWAN—(FORMOSA)—Taipei.
TANGANYIKA—Dar es Salaam.
THAILAND—Bangkok.
TRINIDAD—Port of Spain.
TURKEY—Istanbul.
VENEZUELA—Caracas.

ALLIS-CHALMERS MANUFACTURING COMPANY, Industries Group, Export Department, Milwaukee 1, Wisconsin, U. S. A. Factories in U. S. A., England and Canada.

Two men from Italy raise the curtain on a brand new plastic, with a bright future in the marketplace. This, they say, is certain to happen in an industry that thrives on new materials, and is now in the midst of worldwide expansion.

Plastics: Booming Everywhere

Few materials have captured the world's imagination the way plastics have. They have come to rival older industrial materials—and at the same time they promise a spectacular range of new products.

The plastics boom is worldwide. Here is a sampling of activity:

- Delft, Holland: The Plastics Research Institute (T. N. O.) is researching new ways to string molecules together to make new plastics.
- Israel: The Weizmann Institute, noting the Dead Sea's immense reserves of bromine, is coming up with bromine resins.
- Pakistan: Development work is going ahead on the use of jute as a reinforcement for plastics, especially for applications in construction.
- Italy: The swing to petrochemicals as plastics sources should produce valuable new materials. The first to reach the production stage is polypropylene. It may well be the leading candidate for the next upsurge in plastic technology.

The man on the right (above) holds in his hands a bit of polypropylene yarn. He is Prof. Guido Natta of the Milan Polytechnic Institute, inventor of the polypropylene process that is causing a great deal of excitement in plastics everywhere. With him is Piero Giustinani, managing director of Italy's huge Montecatini chemical combine. Both have been busy lining up licensees for the process, in Europe and in the U. S. A.

Polypropylene is a first cousin to polyethylene, now the world's leading plastic in terms of production capacity—more than 500-million pounds. Most of the excitement is caused by the new material's low cost and properties:

- Its raw material, propylene, now costs less than one-fifth as much as ethylene, the chief "building block" for polyethylene plastics.
- Its physical properties will allow it to be used in many applications that now require higher-priced plastics, such as nylon or the polyester films and fibers. It has greater resistance to heat and solvents than does polyethylene, and can be blended with other resins to obtain combinations of qualities.

No one plastic has gained recognition quickly in the industry's short history. But plastics makers are approaching polypropylene with experience they did not have a few years ago. For one thing, polyethylene has laid much of the groundwork for speedy introduction of the new material. Their experience allows plastics makers to better judge market reactions to polypropylene. Additional assurance of success comes from polyethylene's growing production figures.

A Feeling of Growth

Growth is the key word in all the plastics business. You could sense this feeling at the recent plastics exhibition in New York. Over 35,000 people, many from outside the U. S. A., came to look at the new equipment and materials—and to talk. The talk revolved, mostly, about what lies in the plastics future:

These were some of the comments:

- A chemical company executive, speaking of the use of plastics in construction: "If we run into a structural application that looks good, but do don't have the material at hand, the chances are we can develop one to do the job—from plastics."
- One maker of disposable containers, cups, and plates: "Watch us. It won't be long before we put paper out of business." (He might

"The steel industry worries about plastics . . . It isn't missing any bets—now steelmen are trying to make steel like plastics."

be just a little over-optimistic.)

• A French manufacturer: "In two years France has doubled its resin output, and may double it again by 1965. Polyethylene is in the middle of a huge growth cycle. The same is true for reinforced plastics. Out of this big growth, the French man-in-the-street will take an even larger share."

• An American automotive engineer: "The steel industry worries about plastics. Steelmen are studying possible molecular rearrangement of their material to make it transmit light rays. Steel isn't missing any bets—now they are trying to make steel like plastics."

How to Insure Growth

Against this background, some plastics fabricators pointed the way toward still more growth. But they posed a few problems that would need solving.

In automobiles, for instance, designers struggle for a more favorable power-to-weight ratio. Plastic body panels could be the answer. But plastics have yet to realize anywhere near their full market potential in this application. First of all, plastics will have to be competitive with steel and light metals in terms of both cost and performance. Also the plastics will have to meet the comparatively simple and inexpensive production standards set by the metals.

The automotive people are quick to point out that this does not cut plastics off from future expansion in their industry. For one thing, the trend toward use of "life-time parts"—parts that need no servicing or replacement and resist corrosion—means greater use of plastics. And upholstery fabrics and headlining will soak up a still greater share of the plastics market.

Other industries voiced their special demands:

• The refrigeration industry looks to plastics for a cabinet that will combine insulation with an integral finish inside and outside. The foamed plastics—like polyurethane—may be the answer.

• In construction, the future lies in development of structural and semi-structural units. But a greater understanding of plastics properties and limitations will have to be encouraged. One way is through construction of full-sized, all-plastic houses. France's Industrie des Plastiques Modernes exhibited just such a house recently. In the U. S. A., Monsanto Chemical Co. is starting construction of its "House of Tomorrow" (MD, Feb). Both are aimed at educating the public, architects and builders to plastics.

• The packaging field is eager to use more plastics. They have found that plastic packages not only protect, they sell. Packagers would like to see more efficient packaging machinery for flexible clear sheeting and, of course, lower-priced materials.

Several times the plastics industry was advised by its customers to keep an imaginative approach. Too many products tend to be imitative, rather than original.

More Product Development

The resin manufacturers are acutely aware that they must dig deeper into product development. They will have to provide plastics fabricators with technical information on how to mold and process plastics. And they will have to put more effort into product testing for their customers.

The general trend, at least in the U. S. A., is toward setting up extensive facilities that duplicate customers' production equipment. These are surrounded by laboratories filled with testing machines that provide accurate data on the properties of products. The laboratories and pilot plants turn out reports containing almost all pertinent design specifications and production information. The data covers everything from relatively simple properties such as tensile and impact strength, to extremely complex information on temperature effects and flow properties of molding resins.

The result, plastics producers hope, eventually will be to establish several basic resins as true commodities. In other words someday you may be able to order plastics materials on much the same basis as, say, an alloy steel.

Ahead: A Rosy Glow

Looking ahead, plastics experts hardly expect as great a spurt in output in the next five years as has occurred since 1949. In 1955 alone plastics output jumped 30%, to nearly 3,500-million pounds in the U. S. A. Elsewhere growth was equally as spectacular. The rest of the world produced about 2,000-million pounds of plastics resins in 1955.

The market for plastics products is by no means saturated. But certainly plastics can not be absorbed at the 1955 pace over a long period. Other materials such as aluminum compete with plastics. And there is fierce competition between the plastics themselves.

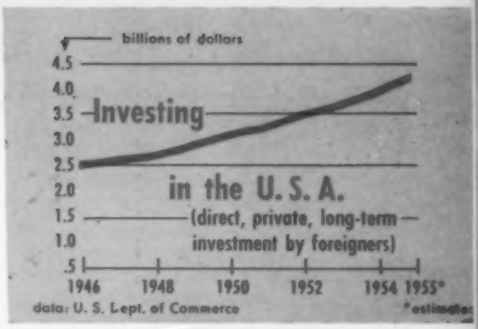
On the other hand, when you look at most of the economist's predictions of the future it is difficult to forsee anything but a plastics expansion at a good healthy pace. Growing populations, more industrialization, higher standards of living are bound to have a favorable influence on plastics.

According to *Modern Plastics* magazine: "The crystal ball has a rosy glow. Barring a war or a globe-shattering depression of catastrophic dimensions, business should continue to expand. The big question is: how much?"

"The plastics expansion has been headed primarily by the newer materials, but it is significant that the older materials such as the cellulosics and phenolics have shown great gain in the past six years. That they stayed in the running by enlarging their old markets and creating new ones augurs well for the future of newer plastics. The newer materials have scarcely had time to find all their possible outlets; and there is no worry as yet about stalemates created after a product has been thoroughly tested for every possible application. In other words, the older plastics must hunt for new applications; the newer plastics are hunted by prospective customers." ●

For Outsiders: Profitable Production in the U.S.A.

Digested from the WALL STREET JOURNAL, May 25



Johann Eerenberg, a Dutchman, passes a field of 2,000 tulips each morning on his way to work—in Englewood, New Jersey, U. S. A. The flower bed flourishes at the U. S. headquarters of a Dutch concern: Erven Lucas Bols Amsterdamsche Likeurstokerij "T Lootsje" Der. The 381-year old Dutch company, a maker of fine liqueurs, is only one of a growing number of foreign concerns now producing in the U. S.

The Bols subsidiary last year made sales of $2-million, twice the 1951 figure. And 1956 promises to show another increase.

There's no way to tell just how many foreign enterprises have set up shop in the U. S. But some idea of their growth may be gained from statistics on direct, long-term investments (excluding mere portfolio investment in securities) by foreigners in the U. S. A. At last report at the end of 1954, foreigners' direct holdings were nearly $4-billion, up 54% since 1947 (chart, above).

Foreign enterprises in the U. S. A. face a number of obstacles, in addition to brisk competition. Wage rates are generally higher. Some U. S. consumers avoid "foreign" products. And a few state and local governments throw obstacles in the way of foreign businessmen.

But there are advantages, of course. By producing in the U. S., a foreign manufacturer skirts uncertain tariff restrictions (see page 15). He eliminates the cost of shipping goods from a foreign plant, and has easier access to a market where consumer incomes are the world's highest.

"Consumers prefer domestic items for their day-to-day needs—they want to be sure they can get them when they need them," says the president of Steelex Corp., a Swedish-owned concern that specializes in production of stainless steel wares. "Besides," he adds, "some products have to be made especially for a given market."

Steelex, which gets its machinery but not its steel from Sweden, has been so successful (1955 sales $500,000) that it moved into larger premises on July 1. Steelex has been producing in the U. S. only since 1950.

In Scotland, hot weather is seldom a problem—yet one of the world's leading firms of air conditioning engineers is a Glasgow company which gained its experience in Scotland's shipyards. Today, through a U. S. subsidiary, Thermotank Inc., Detroit, its Scots technicians are working on multi-million-dollar jobs for that city's automotive giants.

By authorizing their countrymen to retain foreign earnings for reinvestment abroad, officials of the Bank Deutscher Lander made it almost a certainty that German enterprises will soon loom larger on the U. S. scene—as they did before their assets were seized during World War II.

The comeback of German capital has, in fact, already started. Last year, American Collo Corp., an affiliate of Collo-Rheincollodium, GmbH, Bonn, began producing crash pads for autos and other products from urethane foam. Germany's Farbenfabriken Bayer chose the partnership path when it joined Monsanto Chemical Co. to create Mobay Chemical Co.

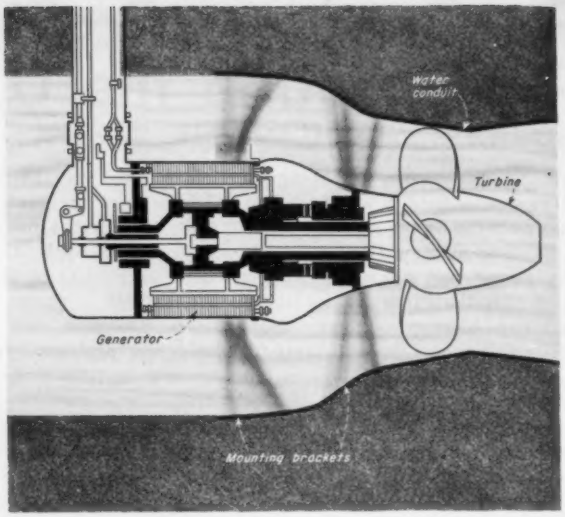
Partnerships offer attractions both to U. S. businessmen and to foreigners. The American partner may have a ready distribution system; he may supply local management. The foreign partner often brings a new process or new product. Earlier this year, International Electronics Corp. was formed by a French concern and its American partner—Cie. Generale de Telegraphe Sans Fils and Airborne Laboratory Inc.—for production of electronics equipment. Recently Britain's Imperial Chemical Industries and Columbia-Southern Chemicals Corp. joined to set up a company that will build a $10-million plant to produce sponge titanium.

For the most part, foreign companies operate alone. And British firms predominate. Dunlop Tire & Rubber Co. has been producing in the U. S. A. since just after World War I. Bowaters Southern Paper Corp. spews forth newsprint at the rate of some 300,000 tons a year in Tennessee, where it began producing in 1954. Tape for venetian blinds is the principal line of another British firm, Thomas French & Sons Ltd. In Illinois, large mobile cranes for construction roll from the plant of Coles Cranes Ltd. British firms in the U. S. also produce tobacco products, phonograph records, soups, toiletries.

Foreign concerns manufacturing in the U. S. have their national specialties. Swiss firms, for example, are most prominent in pharmaceuticals—and chocolate. Swedish firms are strongest in steel. Canadian companies are biggest in alcoholic beverages.

Next to Britain, perhaps no nation in the world has a more diverse colony in America today than the Dutch. North American Philips Co. makes electronic equipment, tungsten and molybdenum wire, and diamond dies in two factories. American Enka Corp., owned by Algemene Kunstzijde Unie N.V., produces rayon yarn. Of course, there are the vast British-Dutch combines of Royal Dutch Shell and Unilever.

Belgians, Italians, Japanese and a growing number of other foreign nationals are finding the U. S. a rewarding site for manufacturing. A Japanese firm last January managed to accomplish something its countrymen couldn't do in four years of fighting: It acquired a piece of Alaskan soil, much of it purchased from the U. S. government, with plans to produce wood pulp there. ●



Man has had scant success producing electric power from the tides. Now, on the Rance estuary in France (above), engineers plan a tidal power plant made possible only by a new turbogenerator (right). Will it work? France will try to find out by . . .

Betting $100-million on the Tides

Digested from ENGINEERING NEWS RECORD, June 14, p36

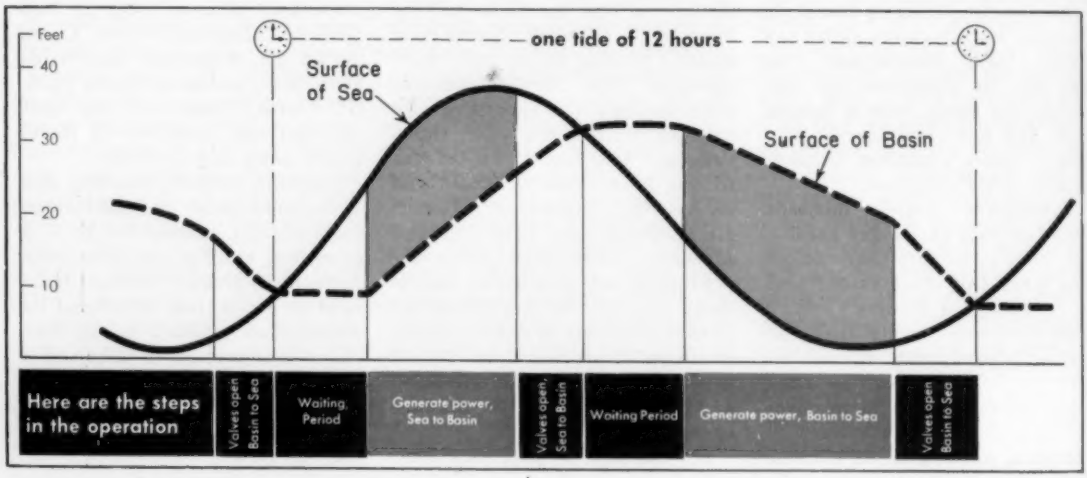
At a time when every nation looks anxiously ahead to its future energy supplies, the engineers are once again studying their age-old dream of harnessing the ocean tides to produce electric power. Now, in France, the dream appears closer to reality than ever before.

At one of the best potential tidal power sites in the world, French engineers hope to build a plant that would—upon completion in 1963 — add 800-million kilowatt hours of cheap, dependable power to the nation's grid. Electricite de France is already at work on the site, just upstream from the Brittany coast on the Rance River. Work began there in 1954, with construction of access roads and a hydraulics laboratory. In 1955, bids were asked on the construction of the power plant. A contract award is expected soon.

The key to the $100-million project is an entirely new machine. It is a relatively small (18 feet wide at the maximum diameter) horizontal-axis turbogenerator, half the weight of a conventional machine, rated at 9,000 kilowatts or 12,000 horsepower. It was developed jointly by Etablissements Neyrpic and Societe Jeumont.

EDF is installing several at other locations for study. The turbogenerators operate completely submerged, and have the special advantage of being able to generate electricity on both the ebb and flood tides.

The plant is designed to have 38 machines, side by side, facing the incoming tide. They would be set into a 2,300 foot long, 160 foot wide dam and powerhouse combined. The roadway across the top will be no more than five feet above the highest tide. EDF hopes to install the first eight generators in 1960. ●



A Crucial Time for Trade Policy

- **Era of tariff cutting that began in 1934, and speeded up with GATT, is about over.**
- **What next in the U. S. A.? Support for OTC and freer trade—or back to high tariffs?**
- **Protectionists are strong, yet growing U. S. A. stake in trade exerts counter pressure.**

Digested from BUSINESS WEEK, June 16, p158

The U.S.A.'s foreign trade policy reached a crossroads when the latest round of multi-nation tariff cutting ended earlier this year in Geneva. The U.S.A. agreed to cut tariffs on imports worth some $750-million; 21 other nations will reduce duties on over $400-million in U.S.A. exports. In all, the Geneva meeting will affect an estimated $2,300-million of world trade.

This will almost certainly be the last big tariff-cutting operation for years to come. World tariff levels by now have probably been shaved very close to the minimum that is politically possible. Thus Geneva may represent the end of an era—which began with the passage of the Reciprocal Trade Act in 1934, and which has seen U.S.A. tariffs steadily cut down.

The question now is whether the general world movement toward freeing trade will continue—or whether there will be a widespread retreat toward protectionism and economic nationalism. The answer will depend largely on the evolution of the U.S.A.'s own trade policies.

The future hangs primarily on the issue of U.S.A. membership in the proposed Organization for Trade Cooperation. OTC would administer and police the General Agreement on Tariffs & Trade (GATT). And U.S.A. acceptance or rejection of OTC is crucial.

GATT has been the framework within which international tariff cutting has been carried out. It embodies general trading rules designed to prevent nations from using other restrictions to nullify tariff concessions.

As GATT's tariff cutting role ends, the emphasis shifts to this second role—the attack on other trade barriers, and enforcement of fair trading standards. That job requires a permanent administrative organization.

There is general agreement in the U.S.A. that if OTC never takes shape—and it won't without U.S.A. participation—a piecemeal repeal of tariff concessions by many nations—all under national protectionist pressures, will result.

Protectionist strength in the U.S.A. is growing as competition from Europe and Japan rises. The migration of many American manufacturers to the South has weakened traditional southern support for free trade policies. Here is a measure of the protectionist activity:

- **Eleven industries are now appealing** to the government for special protection on the ground that they are "essential to defense." A Congressional group wants to challenge the whole idea of "defense essentiality," and to force the Administration to define it.
- **The cotton textile industry** has been seeking a quota on imports of Japanese textiles, and threatens to use its power in Congress to kill OTC if it doesn't get its way. The Administration has not given in, but has tried to compromise by urging the Japanese to set export restrictions.
- **The drive for import quotas** on many products has been gathering strength.
- **The "escape clause"** of the Trade Agreements Act, providing for tariff protection when industries are threatened with injury from overseas competition, was broadened last year.

It is difficult to assess the chances of OTC now. President Eisenhower supports it. Yet the opposition is strong, and Congress had not acted by the time MANAGEMENT DIGEST went to press. If the House of Representatives approves OTC before the year is out, an Administration in 1957 would have a chance of getting it.

Despite the protectionist surge, there are strong forces in the U.S.A. pushing in the direction of freer trade. The U.S.A. stake in expanding world commerce is growing steadily (trade in the first quarter of 1956 was at new record highs). U.S.A. exports now account for about 20% of world trade, and imports for over 14%. Exports in 1955 were 3% of the gross national product—and 5.1% if you include military aid. They absorbed over 11% of industry's total output, up from 8% the year before. Farm exports are equivalent to the cultivated farm acreage of 10 Southern U.S.A. states.

Finally, the switch in Russian strategy from military to economic warfare should spur the U.S.A. to compete more actively.

These are facts that more and more American businessmen are coming to realize.

It is impossible to establish a direct relationship between tariff concessions and trade expansion. But the following figures present some idea of how tariff cutting has affected U.S.A. world trade:

- **GATT members have negotiated concessions** on some 60,000 items of trade; last year U.S.A. exports and imports of these were worth about $14,000-million (nearly half its total trade).
- **The U.S.A. has granted tariff concessions** on over 3,000 imported items, which account for 90% of all its dutiable imports. Tariff concessions granted by other countries now apply to more than 50% of U.S.A. exports.

In addition, progress has been made in removing other trade barriers under GATT. Eleven of 13 Western European nations have relaxed quantitive restrictions on dollar area imports, and eight have freed more than 50% of those imports. And scores of complaints against trade abuses have been settled within the GATT framework. ●

RAUL PREBISCH, Argentine economist, is working hard at the job of . . .

Planning New Growth for all of Latin America

Digested from BUSINESS WEEK, May 26, p153

Raul Prebisch is one of the most powerful men in Latin America. His power comes from his reputation as the region's leading economist. But his prestige rests on more than that. Today, the 55-year-old, Argentine scholar is simultaneously:

- **Head of the United Nations Economic Commission for Latin America** (ECLA) at Santiago, Chile, and;
- **Economic adviser to the government of Argentina.**

At ECLA, Prebisch presides over a forum on Latin American economic problems. But it is a forum that is rapidly developing into something more. Now businessmen everywhere are listening more carefully to what ECLA has to say.

In the past, Latin Americans—as well as outsiders—considered ECLA merely a statistical office and a sounding board, a place to air economic complaints, many of them directed at other world capitals (especially Washington). Now Prebisch and his men are turning the organization into an operating agency that can help member governments with their projects.

For example, ECLA experts are now doing pioneer work to encourage multilateral trade within Latin America. They are holding conferences with government and business officials, trying to cut their way through tariff and exchange regulations that obstruct intra-Latin American trade. The aim: freer flowing commerce, with a clearing system like the European Payments Union, and expanding business for each nation.

Prebisch was a natural choice for the Secretary General's office at ECLA. A brilliant economist, he headed the Argentine Central Bank's research staff before he was 30 years old. Later he became president, only to be fired by Peron.

At ECLA, Prebisch became the spokesman for the economically underdeveloped Latin American nations, talking back to the highly industrialized U.S.A. He puts Latin America's case to the world—and to the U.S.— this way:

Every 1% increase in the U.S. standard of living requires only an 0.66% increase in the production of primary products—the main business of Latin American economies. Yet Latin American living standards rise 1% only by increasing the nations' importation of industrial products by 1.58%.

That kind of unfavorable growth relationship means Latin America must have special privileges, says Prebisch. He asks protection for Latin American industry. He believes Latin American industrial development will not come naturally, that all governments must map detailed programs for development. Latin America must also have government and public international financing. He believes the area needs $1-billion a year for the next 10 years, and that two-thirds of it must come from international agencies, like the World Bank.

Prebisch insists that he is not in favor of "state capitalism." He does not like the term "planning." Instead the ECLA staff speaks of economic "programming."

Prebisch has steadily complained about the small volume of U.S. private investment abroad. He believes Latin America has the right to expect large private investment from the U.S.A. But he does not want investment under terms that would harm local private initiative. "I would like to see the big automobile companies, and investment in petrochemicals," he says. "But why a new cotton mill? We have those, and self development is possible."

Today, everyone is looking to Argentina to see how Prebisch theories work amid the realities of a ruined economy (MD, June). Prebisch has prescribed a tough anti-inflation program, and "austerity" for workers and industry alike. He recommends that the government get out of most businesses. He wants to eliminate controls as fast as possible. All in all, Prebisch favors policies favorable to private business, and a "free" economy.

These recommendations are difficult to apply—especially for a new government facing restless workers and a powerful Peron underground. Success is far from assured. Yet the government has announced that it favors the Prebisch plan.

This is significant: Prebisch has advanced solutions that contradict some of his earlier theories. Indeed, many outsiders have always said that he was a believer in extensive government controls. But like many Latin American economists, Prebisch has been moving steadily away from the idea of strong state control. A reconstructed Argentina, with a healthy "free" economy, would encourage that trend. ●

A FIVE-YEAR PLAN OF SUPERVISORY TRAINING

	Program	Schedule	Participation	Length	Comments
1	Responsibilities of foremen Organization of company Develop foreman's manual	1952-1953 Winter and Spring	33 foremen and staff department members	1½ hrs/wk. for 20 wks.	OBJECT – Let foremen help define duties, responsibilities. Every fourth meeting, staff head talks on function of his group. Standard procedures and preferred practices digested from minutes into 14-page manual.
2	Responsibilities of supervisors Organization of company Develop supervisor's manual	1953 Fall	40 supervisors and group leaders (2 groups)	1½ hrs/wk. for 12 wks.	Same procedure as Stage 1 – for first-line supervisors only. Toward end of Stage 2, foremen and supervisors in mixed groups attended three sessions on quality control conducted by chief chemist.
3	A) Departmental follow-up review	1953 Winter	60 foremen and supervisors (by dept.)	1 hr/wk., then 1 hr/mo.	OBJECT, Part A – Improve foremen-supervisor relations on operating problems. Foremen held weekly, then monthly meetings with subordinates.
	B) Self-help reading program	1954 Spring	60 foremen and supervisors (by dept.)	1 hr/wk. for 7 wks. (alternate)	OBJECT, Part B – Reading in human-relations booklets. Supervisors filled out written quizzes on booklets, then discussed at bi-monthly meetings. Weakest (and only packaged) part of program.
4	Special subjects 1 Organization and communications 2 Work planning 3,4 Leadership 5,6 Followership 7,8 Objective thinking	1954 Fall	60 foremen and Supervisors (4 groups)	1½ hrs/wk. for 8 wks.	OBJECT – Fill in gaps to date. Sessions as follows: 1. Basics of work planning, need for time allotment to all phases of supervisory work. 2. Company objectives reviewed via organization chart; emphasis on communications channels. 3,4,5,6. Human-relations aspects of leadership, based on FACTORY's leadership-followership articles (July, Aug., Sept., Oct. 1951; May 1954). 7,8. Study and practice of logical approach to problem solving.
5	Work simplification	1955 Spring	15 foremen and engineers (1 group)	2 hrs/wk. for 10 wks.	Courses patterned after New York University Industrial Work Simplification Conferences attended by author. Visual presentation, work projects, assignments. Result: Abhorrence of waste by supervisors, cooperation between staff I.E.'s and production foremen.
6	Production control Quality control Waste control	1955-1956 Fall and Winter	60 foremen and supervisors (by dept.)	2 hrs/wk. for 9 wks.	Conducted every Tuesday afternoon by staff men. In three lessons: (1) principles, (2) application to baking, (3) application to each foreman's department. Author acts as coordinator; secures films, other visuals.
7	Work simplification	1955 Fall	15 foremen (1 group)	2 hrs/wk. for 10 wks.	Presentation of basic work simplification down the line to foremen, supervisors, and key operators and mechanics. To be followed by voluntary refresher course for earlier students and for new management men. Added starter (at request of work-simplification graduates): timestudy fundamentals in Phase B.
8	A) Work Simplification	1956 Spring	30 supervisors (2 groups)	2 hrs/wk. for 10 wks.	
	B) Timestudy fundamentals	1956 Spring	Supervisory volunteers	2 hrs/wk. for 4 wks.	
9	Work simplification	1956 Fall	30 supervisors and key operators (2 groups)	2 hrs/wk. for 10 wks.	
10	Human relations	1956-1957 Fall, Winter,	60 foremen and supervisors	2 hrs/wk. for 10 wks.	OBJECT – Learn to transfer knowledge of human-relations principles to performance on job. Case

For Big Savings, Train Your Foremen

Everything a foreman does affects productivity, cost, efficiency. Management's finest cost-cutting ideas can come to nothing unless a company has able foremen, carrying out its ideas on the plant floor. Thus the training of these on-the-line supervisors is one of management's most important—and profitable—tasks.

Below, digested from *Factory Management & Maintenance*, is the outline of a supervisory training program of Burry Biscuit Corp., a U.S. foodstuffs manufacturer (900 employees, $18-million sales).

Next month, the foremen's training program at Burry enters Phase 9 of its development (see table above). Begun four years ago, the plan aims at making every supervisor an industrial engineer—slowly and carefully, over a five-year period. Already, Burry says that

". . . Secret of its success is the way it has joined supervisory training with the industrial engineering program."

the program has helped to achieve these results:

- **Direct labor productivity is up close to 25%**—with no major additions of labor-saving equipment.
- **Labor turnover is down to 4½% from a high 22% per month.**
- **Absenteeism is down to 3%, from a high of 11%.**

Burry believes that $50,000 yearly savings can be credited to improved supervisors—and that saving came from a program that has cost only $6,000 since its beginning.

To be sure, improved supervision in the plant isn't the only source of Burry's progress. Sales have increased five times since 1948, and better planning, improved methods have helped raise productivity. But Burry believes the secret of its success has been the way it has joined supervisory training with the industrial engineering program.

Burry's industrial engineering department is responsible for motion and time study, incentives, cost control, plant layout, materials handling, job evaluation. The extra burden of supervisory training was added to the department because Burry believes that industrial engineering objectives, and the foreman's performance, are inseparable.

The foreman must participate in management; he must make suggestions, be receptive to new ideas. Burry knows that the more each foreman demands from the industrial engineering department, the more the department will develop new ideas and new methods.

Burry laid the groundwork for its five-year plan with the help of an outside management consultant. A plant staff group, meeting in the winter of 1952-1953, decided the program should:

- **Be designed for lasting results,** rather than sudden, hurried enthusiasm.
- **Avoid over-training.** Burry didn't want to defeat its purpose by not giving foremen a chance to use what they learned in one program before launching another.
- **Improve present foremen.** Burry knew that some supervisory jobs could be bolstered by hiring new men. But the company felt it had much to gain, in morale and performance, by staying with the present foremen.
- **Require regular attendance.** Burry believes that training is part of the foremen's job. Foremen are paid overtime when sessions fall outside the work day.

The entire program was planned in easy stages. As the chart (page 17) shows, training begins at the top and moves down to the point where, next month, some hourly employees are scheduled for work simplification training.

In early stages, Burry was content with hard-to-measure benefits —like finding foremen working "smarter," not harder; and carrying their new knowledge of the company to their workers. As the training program went on, these attitudes kept growing.

The total cost, says Burry, of a program for 60 supervisors in a 900-employee plant has been not much more than $6,000. Of that, $1,250 involved setting up the program (including consultant's fees); $1,900 went for instructors' salaries (not including the time of Burry management); $2,493 for training equipment and materials; and $365 for overtime payment to foremen.

Burry lists these eight considerations for any company that hopes to set up such a program:

1. **Get the support and participation of top management**—at the beginning, and during each phase of training.
2. **Plan the program right down to specific phases,** two or even three years in advance.
3. **Get variety into the program**—with lectures, conferences, workshops, case studies. Maintain good facilities; use films frequently.
4. **Give "students" outside assignments related to their jobs.**
5. **Spend as much time on following-up** the actual training as you do on the sessions themselves. Training is wasteful if supervisors do not have plenty of opportunity to practice what they learn.
6. **Give recognition to "graduates" of the course:** for example, letters of commendation from management, special parties.
7. **Plan "refresher" courses** for those who have already been through the training.
8. **Plan with long range objectives in mind.** Immediate results may be disappointing unless top management is accustomed to the fact that measurable results sometimes require two or three years. ●

The Foreman: One Man's Opinion

"You could dispose of almost all the leadership training courses for supervision in American industry today without anyone knowing the difference." This sweeping statement came from Robert H. Guest, a researcher at Yale University. He admits the statement is extreme, and that he made it with the intention of stirring up discussion.

Guest headed a team that last year observed 56 foremen in an auto plant, recorded and studied everything they did every minute of the day. He makes these points: (1) Lectures and classroom techniques don't really change the way people behave; and (2) what people are told in training courses, or the ideal situation often assumed by the training director, bears little or no resemblance to the actual situation in the plant.

Specifically, Guest reports that some foremen spend 30% to 50% of their time chasing down details, doing the work of hourly-rated workers.

Commenting on Guest's report, the editors of *Factory Management & Maintenance* say they are not sure they can agree with it categorically. It may be, they suggest, that Guest is just finding out what most good training directors know already. But, says *Factory*, his conclusion does underline serious need to find out exactly what a supervisor's job is in your plant. And then go to work at ways to improve the job —before telling the foreman to change his ways of doing things.

After 50 Years—Men Call It "Productivity"

FREDERICK W. TAYLOR (picture), has been called the "father of industrial management." Fifty years ago he laid the foundation for the studies, and the applications, of "scientific management" that the world knows today. His ideas are reflected in the attitudes of individuals, corporations, and management groups everywhere.

This year is the 100th anniversary of Taylor's birth. In looking ahead to management's future, it is useful to look back to Taylor's work.

Taylor, and "Taylorism," provoked bitter disagreement in the early 1900s. The American Federation of Labor denounced "Taylorism" as a "diabolical scheme" to treat men like machines. At first, only a small band of devoted pioneers managed to keep Taylor's ideas alive.

These ideas were worked out in the shop—Taylor's major contributions were at the factory operating level. For example, in 1903 he developed a formula that can still be recognized by every industrial engineer in the factory, and is the heart of scientific management:

- Specify a definite task. There should be no room for misunderstanding by the worker of the results expected of him. These results should be determined by an analysis of the sequence of operations through which the whole job passes.
- Allow a definite time—determined by stopwatch time study or from standard data.
- Prescribe definite methods for the worker.

Though he "retired" in 1901, Taylor spent the next 15 years as a consultant and lecturer in the U. S. A. and in Europe, everywhere promoting the idea of the "engineer in management."

Scientific management quickly became an international movement. Along with the American pioneers such as Taylor, the Gilbreths, Wallace Clark, go Charles Babbage, Lyndall Urwick of Britain; Le Chatelier, de Fremenville, Fayol of France; Italy's Francesco Mauro, and others.

In fact, the impetus for the first international management organization came indirectly from two young Czechs, who wanted to apply scientific management to the economic development of Czechoslovakia. With help from the Czech government and the U. S. A., the First International Management Congress was held in Prague in 1924. Later, the Comite International de l'Organisation Scientifique (CIOS)—the International Committee for Scientific Management—was established to link management groups everywhere.

The phrase "scientific management" was adapted and translated by many nations to suit their needs. In France it was "organisation scientifique;" Britain used just "management" or "efficiency"; it was "Wirtschaftlichkeit" in Germany and "Razionalizzazione" and later, "Ergotecnica," in Italy.

After World War II came a new word that was to dramatize scientific management as never before. It was "Productivity."

With the drive for increased productivity—which means simply raising output per man hour by means of more efficiency—came a new way of looking at management. What had been the preoccupation of a small group of private citizens—often opposed by labor and business—became official government policy. The productivity movement was backed by billions of dollars of American Marshall Plan funds. Productivity centers were organized; productivity "teams" of businessmen exchanged. Taylor's scientific management took on a new and powerful significance. People around the world were told that by the magic of increased productivity living standards would rise.

Governments and inter-government bodies seem to have become the greatest force in the international productivity movement. But it would be a mistake for private business to leave the job to governments alone. Only private business can see to it that management techniques continue to advance.

It is encouraging to see management men in many countries seeing more of each other, discussing their problems in many formal and informal meetings. CIOS is still an active institution—with 27 member groups in 27 countries.

Regional organizations under CIOS are being formed too. Next fall—November 12 to 17—the Western Hemisphere will have its first management conference under the Pan American Council of CIOS at Santiago, Chile. Then, in June, 1957, the XI International Management Congress meets in Paris—for all of CIOS.

These, and many other activities, present an opportunity for men of management who are seeking, as Taylor sought, a more fruitful industrial society.

—The Editors

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YOU AND YOUR PERSONAL AFFAIRS

To the French it is haute fidélité. The Spanish say alta fidelidad. The Germans sometimes use the coined expression "Three-D Klang." In all parts of the world, people are talking about "high fidelity."

Superior quality records and equipment that make music sound "alive," as though it came from a concert stage, have captured home audiences everywhere. It is a multi-million dollar business around the world.

To the music lover, high fidelity is almost a "must"—sooner or later. The amateur engineer or carpenter should consider it, too. The radio builder who thrives on electronic devices, and the cabinet maker can build some units of a "system." (For the collector, there is no end to the challenge of records.)

Caution: plan your system before you spend anything.

✦ ✦ ✦

The high fidelity system consists of four basic units—radio tuner, record player, audio amplifier, and loudspeaker. The radio tuner locates and amplifies radio-frequency "signals"—either AM, FM, or both. The record-player has a 3-speed turntable, a pick-up arm, and pick-up. The pick-up contains a stylus of sapphire or diamond—replacing the outmoded phonograph needle; it creates electrical vibrations or "signals" inside a small cartridge. The audio amplifier intensifies the minute signals that come from either radio or record-player. In effect, it multiplies them millions of times, and feeds undistorted sound to the loudspeaker.

The loudspeaker generates sound vibrations from the amplified "signals." It needs an enclosed airspace, or cabinet, to control the vibrations and project them. The speaker cabinet can be (1) a tight, rigid box of at least five cubic feet lined with soft padding; (2) a miniature cabinet (2½ cu. ft.) with an especially designed acoustical interior—for small rooms; or (3) a bass-reflex cabinet, with special interior design to develop full tones (plans for these are generally available).

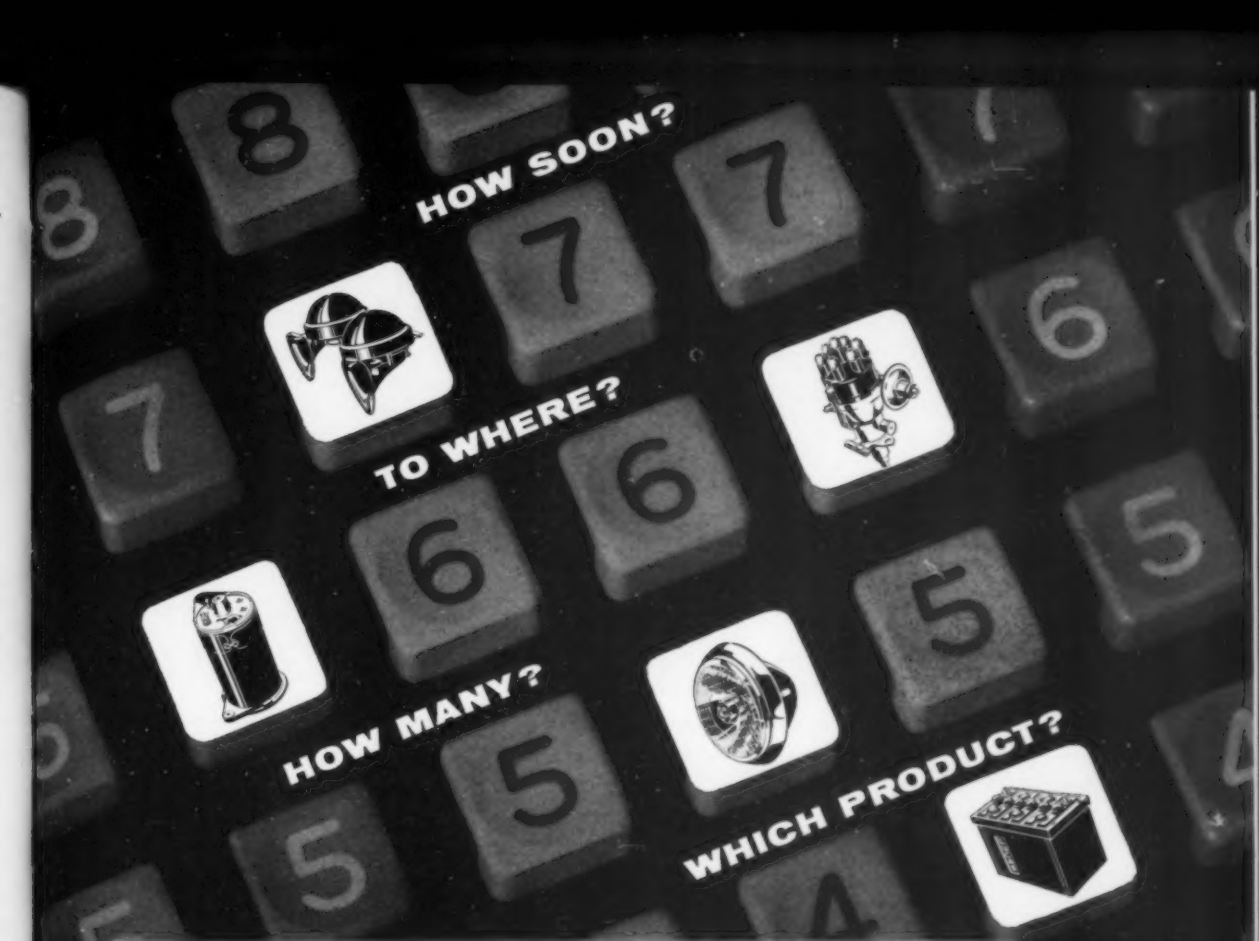
Best place to locate the speaker is usually a room corner, between two solid walls. But odd room shapes can change this—so experiment. Frequently a 2-way, 3-way, or 4-way speaker system is used to get a wider and richer range of tone. Before trying an elaborate speaker system, though, consult an expert who can help you get the best result.

✦ ✦ ✦

Plan your system, all components of it. You may want just three units—eliminate the radio tuner, and play records only. Or you may want more than four units—add a tape recorder or a television connection.

Your system needs balance. A very expensive audio amplifier (prices range from $50 to $500) will mean little if your loudspeaker is inexpensive, and poorly designed. You can buy the four basic components for self-assembly (for around $250) and add other features eventually. Or you can buy complete, packaged systems, ready to play, for the equivalent of $150 to $2,000, or more. High quality, long-playing records—really the fifth basic unit of high fidelity—cost about $3 to $6 and are headed down.

A diamond stylus is best. It lasts up to 75 times as long as its nearest rival, the sapphire, and saves record quality.



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"Burroughs machines pay for themselves," Lucas tells T. A. Patton, Burroughs specialist.

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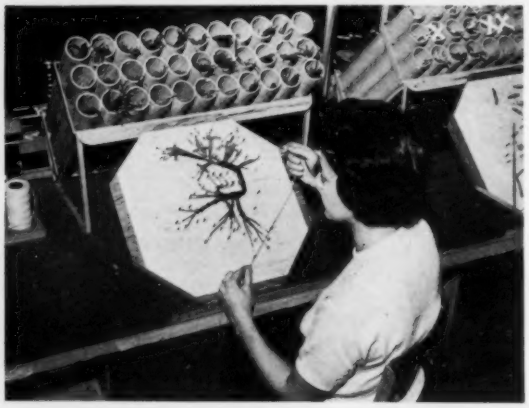
Six Cost-Cutters for Your Plant

Digested from FACTORY MANAGEMENT & MAINTENANCE

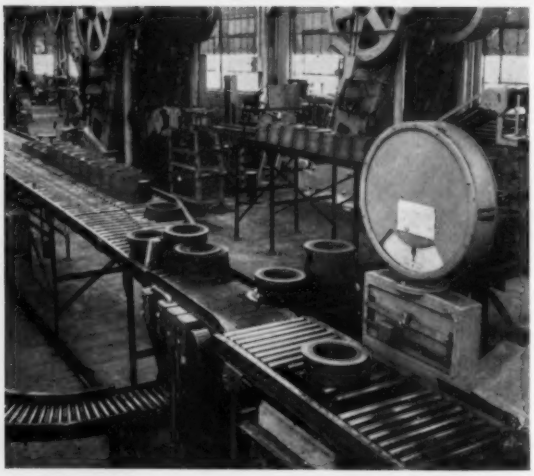


Peg Board Doubles Output

This operator used to assemble six or seven wire harnesses per shift. Now she does 16. Why the increase? Because she now works with an octagonal peg board. The former assembly method was slow and tiresome. With a blueprint at her elbow, but with no fixture to help her, the operator formed 35 wires into a harness.

Now the harness is assembled over a blueprint that is mounted right on the octagonal board. Diagram markings show what wire goes where. Each wire is attached to two pegs (terminals). Spring clips hold clusters of wires together.

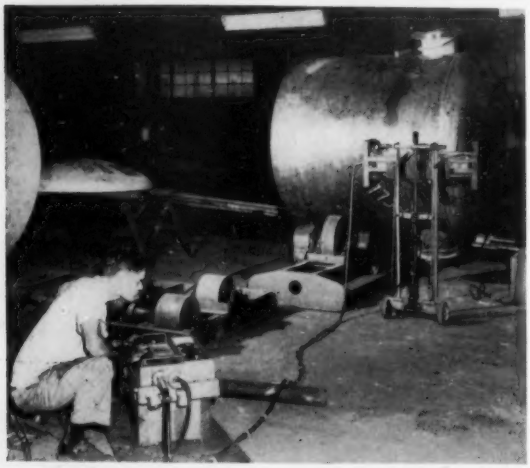
Cardboard cylinders are arranged in the sequence in which wires are used.



Weigh, Don't Count

Instead of counting stator blanks for the correct number for each motor, General Electric Co. has a scale do the job. Blanks arrive at this weigh station on two roller conveyors. The operator slides approximately the correct number of blanks onto the scale section of the conveyor. Then, by glancing at the scale (which is marked "over" and "under"), he can quickly determine whether to add a blank or two, or take any off. When his scale balances (one try is usually enough), he rolls the stack off the scale section, and it moves on to an automatic welder.

The plant management says "this method is a great deal faster than counting, and—because of possible variations in blank thickness—is more accurate."



X-Ray Rolls to Job

When you build pressure vessels, you must be sure they are sound. At one time this was quite a problem at Junkin Corp. (Charleston, W. Va.). But inspection time has been cut 90% by the portable X-ray unit shown here. The whole unit is easily moved, by one man, to any place in the shop where a test must be made. It is also easy to take the unit out into the field to check installations in use at other plants.

If considerable testing throughout a large shop were involved, the unit could be mounted on a powered hand truck instead of the truck shown.

The entire pressure vessel in the picture (6 feet in diameter, with a butt-welded headseam) was completely inspected in three hours, with 18 X-ray pictures.

No-Stoop Stapling

This simple device eliminated a lot of bending—meaning a lot less fatigue for the worker. And a 70% reduction in labor cost.

Here's what happens. The product to be packaged is mounted on a pallet-like base. A carton is placed over it, and stapled to the base. Until now, the operator had to get down close to the floor to drive the staples. But by adapting a standard pneumatic stapler as shown here, the operator can work in a normal standing position. The stapler is mounted at the proper height on a small carriage. The air switch controlling the stapler is actuated by a lever leading to the carriage handle.

Supermarket "Sells" Parts

A huge U. S. Air Force base has replaced its stockroom with a supermarket. Employees can "shop" for their parts and supplies instead of going through an elaborate and time-consuming requisitioning procedure. Here's how:

Suppose a clerk needed supplies. She goes to the supply store, drops into her shopping cart just what she needs, and perhaps a few things for the next job coming up. Each item is price-marked, and the Air Force finds its people doing considerable "shopping for value." At the check-out counter, the "cashier" marks a card with the "shopper's" name, stock number of parts selected, and price. The bill is charged against the shopper's department.

Exhaust Does Double-Duty

The exhaust air of this air-powered portable router is put to work by Glenn L. Martin Aircraft Co. (Baltimore, Md.)—to do two jobs formerly done by hand.

Lubricant used to be applied to the router's cutter by a paint brush. And the chips were blown away with an air hose from time to time. Now, as shown here, an air tube is attached to the tool's exhaust port, and an oil cup to the air tube. Thus, a fine flow of oil is fed into the exhaust air and directed onto cutters by tube. It mist-lubricates the cutter and cleans away chips simultaneously.

This idea isn't limited to routers—or, for that matter, to hand tools. Almost any air-operated tool could be fitted with the tube.

It takes a world of products to make a ton of Bethlehem steel. In fact, Bethlehem is a customer of *41 countries* around the globe.

In this world market, Bethlehem buys chrome, tin, tungsten, manganese, fluorspar, hemp, rubber, paper pulp and chemicals — to go into the steel itself or to be used in plant operations.

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How Ten Different Coatings Compare

Cover coating	Cost			Ease of application	Resistance to						RATING
	Cost per gal.	Cost per mil thickness	Cost per year		Temperature	Weather and sunlight	Solvents	Salts	Alkalis	Acids	
Neoprene	2	10	10	6	10	7	3	10	10	6	74
Styrene copolymer	6	7	7	9	7	6	3	10	10	7	72
Vinyl	5	6	8	9	7	8	4	10	7	8	72
Chlorinated rubber	5	5	7	9	6	7	3	10	10	8	70
Saran	3	5	6	9	7	7	5	10	7	9	68
Epoxy	1	6	7	7	9	6	6	10	7	6	65
Alkyd	7	8	2	10	5	9	2	6	2	4	55
Asphalt	10	6	3	9	2	5	1	10	7	5	58
Oil base	9	9	1	9	3	10	2	5	1	2	51
Polyvinyl acetate	8	6	4	9	5	7	2	3	2	3	49

How to Get the Most From Paint

Digested from TEXTILE WORLD, June, p98

Maintenance men everywhere are taking a more scientific approach to painting techniques. You have to know what kind of paint to put where. And you have to consider cost, paint life, surface condition, exposure conditions.

Industry is choosing paints by specifications, rather than by guess. Nobody has yet come up with the perfect all-purpose paint —for all surfaces, under all conditions.

Surface preparation is one of the most critical factors that govern the performance of paints. Surface preparation consists of proper cleaning combined with a treatment of the clean surface to increase its affinity for subsequent painting.

There are several mechanical and chemical cleaning methods. Pick the most appropriate one for the job to be done. For instance, blast cleaning is considered superior to wire brushing. But it costs more. Wash-primer, a pretreatment phosphate-type brushed-on coating, has been used extensively on metals. It gives best results when used on blast-cleaned or chemically-cleaned surfaces. This treatment is particularly good for surfaces exposed to severe corrosive conditions or surfaces immersed in water.

The following painting systems are recommended for exterior and interior wood, and masonry:

- **Prime exterior wood structures:** Use a ready-mixed lead-in-oil primer. Top-coat the primer with a ready-mixed titanium-lead-zinc-in-oil exterior paint.
- **Prime interior wood:** Use an alkyd fast-drying enamel undercoat. Finish the surface with one of several top coats, depending on whether a flat, semigloss, or gloss surface is desired.
- **Exterior masonry surfaces:** Coat with two coats of cement water paint or two coats of exterior ready-mixed concrete-and-masonry titanium-lead-zinc-in-oil paint.
- **Interior concrete surfaces:** Coat with chlorinated rubber-base paint. Another good method is to use a rubber-base paint as a surface sealer and cover it with a conventional interior paint.

Complete painting systems for metals that will meet specific requirements are shown in the table (above), which gives comparative values between various systems for corrosion resistance on metals. In the table, the values of each category are comparative; the greatest value is 10 points. For the cost and ease-of-application categories, 10 indicates the least costly and the easiest to apply, respectively.

In the resistance-to-attack column, 10 indicates no attack; and smaller numbers indicate materials less resistant to attack.

The four major methods of paint application are brush, spray, roller, and dip. Each method has advantages and disadvantages, depending on the job to be done. Roller coating has increased in use and results are excellent where spray coating cannot be used because of hazards from overspray or flammability of the solvent. Temperature and humidity govern when paints may be applied. The minimum temperature is 45°F., and the maximum is 90°F. The range of relative humidity is 40 to 70%.

Paint should serve its useful life by a gradual chalking. On exterior paint, a gradual loss of gloss is followed by the appearance of a fine chalky material. The duration of chalking varies with the film thickness, area, and exposure. ●

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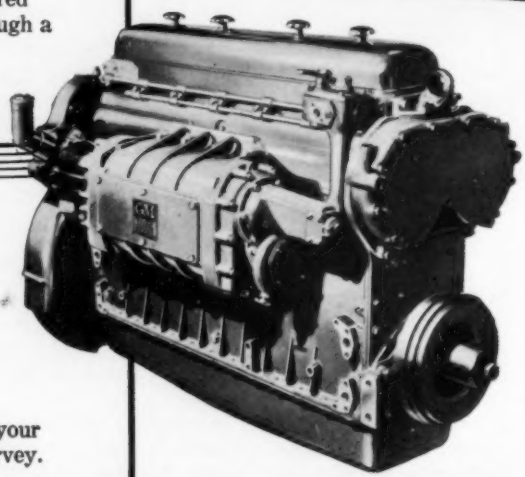

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URUGUAY, Montevideo
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Take Treated Poles . . .

. . . Nail on Boards . . .

. . . and It's a Warehouse

Digested from BUSINESS WEEK, June 2, p84

Improved methods for chemically treating and preserving wooden poles promise to put pole-type structures, like the one pictured above, in competition with the more expensive kind that need foundations.

Chemical pressure treatment makes the poles last longer in the ground. This is likely to encourage a new trend in warehousing—where weather and other conditions permit.

Pole-type constructions are simple and easy to erect, as well as cheap (about $1 per square foot in the U.S.A.). The chemically treated poles are sunk directly into postholes in the ground. They act as the only vertical support members; no foundation is required. Sheathing and horizontal structural timbers are nailed to the poles. General purpose shelters, with open or closed sides, can be used for barns, lumber yards, vehicle storage sheds, and as warehouses where more expensive buildings would be impractical. Sheathing and other parts (except poles) need no treatment.

Creosote and the newer pentachlorophenol (penta) are the most common preservatives. Both are applied to wood under air pressure and heat. Thanks to its clean, easy-to-handle characteristics, penta is gaining in popularity. It does not raise or warp the wood grain, resists metal corrosion, and is poisonous to termites. Moreover, it will repel water, and thus inhibit rot. ●

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Looking Ahead In Production

Nuclear Notes: Canada will supply about half the $14-million needed for a research reactor in India. Canada will build the reactor, supervise engineering, and train Indian personnel in operation. Completion is scheduled for mid-1958. . . This month, Britain's first full-scale atomic power station at Calder Hall will start feeding electricity into the nation's network. Formal dedication will take place in October when Queen Elizabeth will visit the station. . . The Foundation for Shipbuilding Research, Goteborg, Sweden, is now completing blueprints for a nuclear propulsion plant for ships delivering 20,000 shaft-horsepower. "Low-content uranium" will be used with a 21-month refueling cycle. The Swedes feel that if they are not to lose out in international competition, they must start building such ships soon.

Allis-Chalmers Mfg. Co. (Milwaukee, Wisconsin, U. S. A.) has opened a pilot plant to test and demonstrate a new cement process. Developed by Otto George Lellep, a German inventor, the process employs a double-pass preheat system that is said to offer cleanliness and big fuel economies.

Allis-Chalmers feels that the process can save between $100,000 and $200,000 a year on fuel for plants having annual capacities of 1.3-million barrels. The company expects to market the process in Latin America.

Production Briefs: Titanium plating on less-valuable metals is being investigated. Object: corrosion resistant finishes. . . Add a new phrase to your "automation" dictionary: "middle-ground automation." It means manual transfer of work on roller conveyors between automatic, multi-purpose machines. And it can be found at International Harvester Co.'s Indianapolis (Indiana, U. S. A.) plant, where it is the solution to turning out V-8 and in-line 6-cylinder truck engines.

Many Businesses Can't USE The Air You Breathe

THE air you breathe every day is much too costly for businesses where dust and soot can affect the quality or appearance of products. Such operations as food and beverage processing, assembly of precision equipment and manufacture of textiles and pharmaceuticals demand *super-clean* air.

Thirty years of "living" with industry's varying air cleaning problems has led to AAF's development of the *only complete line* of air filters, involving all the principles of air filtration—electronic precipitation, dry filtration and viscous impingement.

AAF's complete-line-of-product approach assures you of the right filter for your requirements, without compromise. Send for name of your local AAF representative and free booklet, *Dust Dollars and Dividends.*

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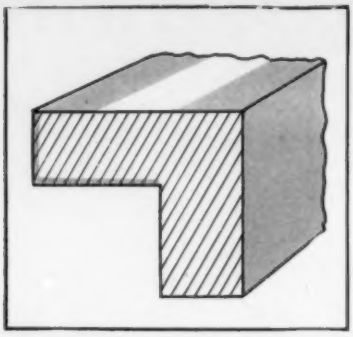
The **'Jeep'** *family of 4-Wheel-Drive vehicles*

Willys-Overland Export Corporation, Toledo 1, Ohio, U.S.A.

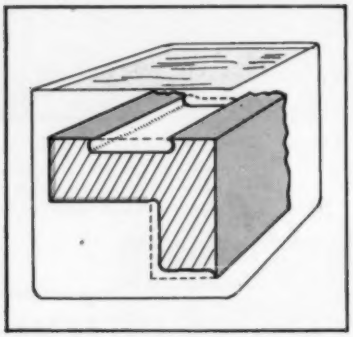
*This is conservative. Some estimates place the mileage at more than fifty billion kilometers.

"Chem Milling:" New Idea for Metalworking

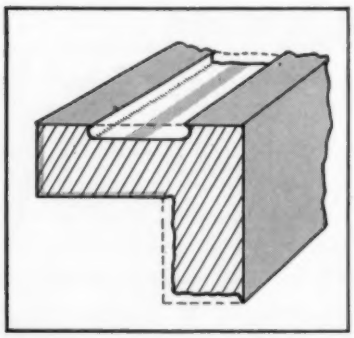
Digested from AMERICAN MACHINIST, June 4, p170; CHEMICAL WEEK, May 26, p60



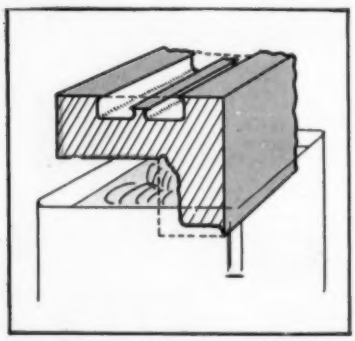
1. Apply protective film to metal; immerse in etching solution.



2. Solution eats unprotected metal—even under the edge of the protective masking material.



3. Remove from etch bath, apply second layer of masking, and return to etch bath.



4. Taper results when part is slowly removed from bath.

Suppose you have a product design that calls for a sheet of metal one-quarter-inch thick. Suppose, for reasons of weight, that the sheet should have certain areas made thinner than others. To complicate the problem further, the sheet—in its final form—must be curved. How would you do it?

One way would be to cut out the unwanted sections on a milling machine while the sheet was still flat. But when you curved it, the chances are good that the sheet would distort, and rejects would mount. Or you could curve the sheet first and then mill it. Here you would have a three-dimensional milling problem—with a lot of headaches and costly special tooling.

Turco Products (Los Angeles, California) may have a solution to the problem. It's called "Chem Milling" and is similar to the engraving process. Acids or alkalis, instead of cutting tools, etch metal surfaces. It supplements machining, but does not replace the milling machine, which does many jobs cheaper than chemical milling. (Turco is licensing the process to companies outside the U. S. A.)

Chem Milling can do several things that milling machines can not, such as remove metal from curved surfaces, and at a rate of a thousandth of an inch a minute.

Here is how it works: The drawings (left) show, greatly simplified and somewhat exaggerated, some of the advantages of the process. Masking the part with an etchproof material controls the area Chem Milled. Masking can be applied by stenciling, drawing, painting, or printing. Vinyl films make good protective coatings, but other materials, such as photosensitive gelatins, can be used.

As illustrated, the pattern must be made somewhat larger than the area it is to block out; the etching solution cuts under the edge of the mask as well as downward. But this can be controlled; tolerances of 0.002 inch have been produced.

After a portion of the etching has been completed, the part may be withdrawn, washed, and coated again with the masking material. It can then be returned to the etching bath, and further "milling" done (Fig. 3).

The process can be combined with other processes. A sheet of steel, for example, could be stamped, rolled, welded, then Chem-Milled. By selecting the right masking material (one that will stick to the metal), Chem Milling can be done after these operations.

Chem Milling will work with most metals. So far, the process is being used for aluminum only, but a pilot plant for titanium, magnesium, and steel has just been built.

So far, practically all applications have been in the aircraft industry. But other industries are giving Chem Milling a serious look. The major drawback to date seems to be cost. Turco says it takes 50¢ worth of chemicals to remove 1 pound of aluminum. This does not include labor costs, or money spent for equipment, cleaners and masking materials. Turco declines to give any estimated average figure for the overall cost of Chem-Milling any part.

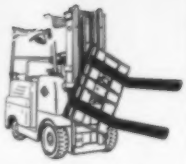
The automotive industry says it can use Chem-Milling but wants definite figures on what it will cost to treat a given part. Shipbuilders have also shown interest—especially since aluminum superstructures began gaining wide acceptance. And the home-appliance industry sees possibilities in Chem-Milling for smoothing rough edges of parts.

Once Turco catches up with aircraft industry demand, it will turn to other industries. Meanwhile, development outside aircraft will remain exploratory and experimental. ●

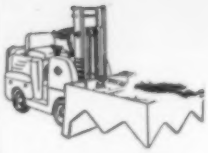
Crane Arm

Hydraulic or Mechanical Scoop

Side Shifter

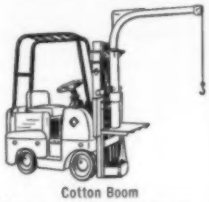


Revolving Carriage



Multiple Drum Carriage

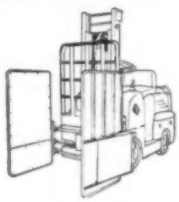
Dual Telescopic Mast



Cotton Boom

360° Rotating Carriage and Clamp

Unloader



Carton Clamp

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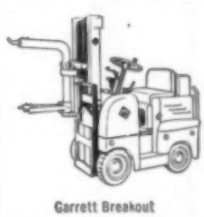
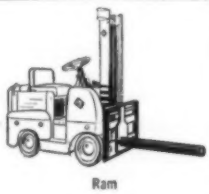
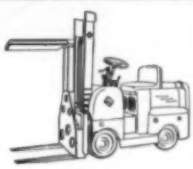


Garrett Breakout



Ram

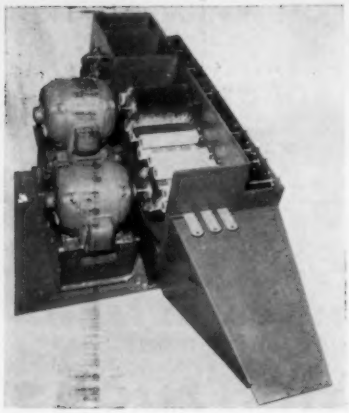
Brick and Block Forks



Load Stabilizer

Extension Package Rack

Clamps



LOOSE SCALE is removed from both sides of hacksaw blades by wound-strip brushes.

OLD INK is removed from thin lithograph plates by soft synthetic-fiber brushes.

New Jobs for Power Brushes

Digested from AMERICAN MACHINIST, June 4, p134

You can use brushes for more jobs than dusting floors. The metalworking industry has for years cleaned and finished parts with power brushes. Now, brushes are actually being employed in a metal-cutting technique.

Here are a few ideas of how you can use power brushes in your plant:

• **Remove coatings**—Excess graphite and shellac on printed electronic-circuit panels are removed by brushes. The copper circuit must not be disturbed. Hence a delicate touch is necessary. The panels are coated with an abrasive-water mix and fed under a rotating spiral-strip brush. The difference between the speed of the brush and the panel feed is just enough to remove the coating but not disturb the copper circuit.

• **Remove Burrs, Produce Radius**—Sawed ends of aluminum tubes needed deburring (smoothing a rough edge) and a radius. Tubes are conveyed between locating pins. A retainer forces the tubes to rotate past the face of the brush. Wire brushes remove the burrs and produce a radius.

• **Abrade Surfaces**—When pressure welding aluminum plates, mating surfaces must be roughened. After the plates have been thoroughly cleaned, they are passed through a scratch-brushing machine where the top surface is abraded by a spiral-strip brush made of hardened steel wire. The plate is carried on a conveyor under the brushes and leaves the machine with the proper satin finish for bonding.

• **Decorative Finish**—A fire-extinguisher manufacturer wanted an attractive lustre finish on his product that would "shed" fingerprints. Power brushes were the answer. Other metal products such as furniture and appliances have been successfully power-brushed for fine finishes.

From the butter-and-egg business comes an idea that manufacturers might find useful. Rotating spiral-strip brushes provide a continuous conveyor to carry eggs to a central collection point. Soft fibers move the eggs along without damage. The same idea might work with delicate products.

Similarly, brushes can be used to provide controllable "drag," as a brake or friction source. For example, parts ejected from a machine at high speed can be passed, or dropped, through a brush-lined area to slow them down before they reach the tote box. Or, brushes can control the speed of cartons conveyed to a storage area.

Still another application is orientation for automatic feeding. Brushes will provide sufficient resistance to turn or remove an incorrectly positioned piece. ●

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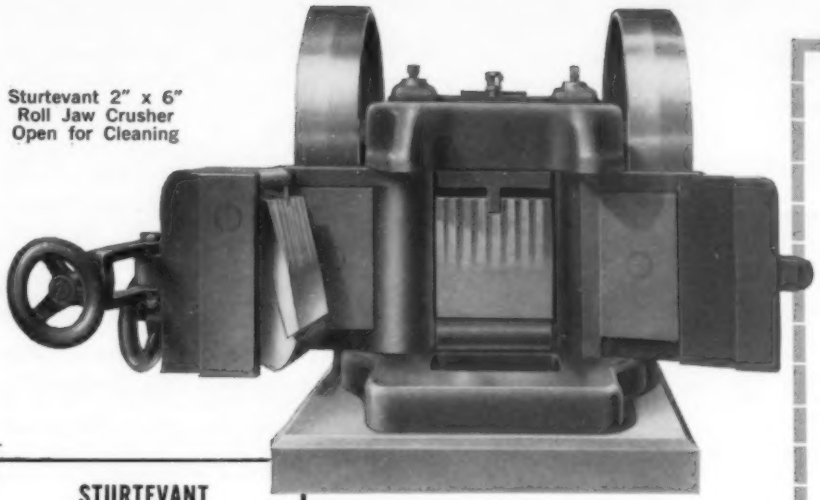

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Here are a few of the things that go into "spray packages" these days — lacquer, suntan oil, shaving cream, insect killer, air purifier, perfume. And there are many more to come, as new processes speed industry growth.

The Boom in Aerosol Products

Digested from PRINTERS' INK, June 15, p29; CHEMICAL WEEK, June 16, p44

The housewife opens the box, takes out the container, points the top part at her kitchen window, presses a button—and zip—a film of liquid cleaner sprays on the glass. She uses exactly the amount she wants, and puts it exactly where she wants it—for a quicker, easier, and more economical job. She likes this convenient spray container—for glass cleaners and many other products—and returns to the store for more.

In the U. S. A., about 500,000 spray units were sold in 1947. In 1955 the total was 250-million—an increase in sales of nearly 5,000% in 9 years.

That is the story of "aerosol" packaging — something marketing men call "the fastest moving package idea that ever hit the retail trades." If your product is a liquid, lotion, emulsion, cream, or even a dry powder, you may move it across store counters faster with the aid of a pressurized spray container.

Technically, the basic idea is simple. The product is put into a metal can, glass bottle, or plastic bottle, along with a propellent gas or liquid under pressure. When the mixture is released—through a tiny nozzle opening—it sprays out, or foams out, in any desired quantity. New chemical and packaging improvements are now greatly extending the range of products that can be packaged this way. (See Product Digest on another page in this issue.)

Housewives today can buy more than 100 products in aerosol form. Further expansion in aerosols in the near future will come mostly from two directions—food products packed in cans and bottles, and toiletries packed in glass or plastic bottles. Industry will make greater use of the idea, too. Preparations now pressure-packed for industrial use include a liquid used to detect flaws in metal castings, waterproof coatings for automobile ignition systems, and tarnish preventatives for metals.

A good example of aerosol technique has been introduced by Connecticut Chemical Research Corp., Bridgeport, Connecticut, U. S. A. CCR has invented a process that makes possible pressure-packages for virtually every product in liquid, cream, or powder form. Called Polysol, the process utilizes non-refrigerant gases. This is a big step ahead—because propellent gases commonly used in aerosol packaging are refrigerant gases, unsuitable for use with many water-based products and many chemicals.

With food aerosols, as in other lines, "the future belongs to those who dare to do the unusual," says Earl Graham of Crown Cork & Seal Co., a U. S. container concern. "A salad dressing with the texture and appearance of whipped cream, but with the taste and flavor of salad dressing, is an illustration of what can be done."

Up to now, notes Graham, food aerosols have been limited to pressurized whipped cream or soft candy topping. Among potential food aerosols are cake frosting, catsup (tomato sauce), shortening, cream salad dressing, meat or fish

pastes, French salad dressing, chocolate syrup, peanut butter, soy bean sauce, mustard.

Glass-packed aerosols have been perfected, too; and they are considered an advance over metal cans. Sales in this line are expected to rise steadily. Two recent developments: a new type of low-pressure Freon gas for use as a propellent in glass containers, and a method for coating glass bottles with a light film of plastic to make them shatterproof.

Glass aerosols will greatly widen the aerosol product field. Such items as anti-perspirants and some shampoos, for example, cannot be packed in metal because they are corrosive. They have a bright future—packed in push-button glass jars.

Cosmetics companies, generally, expect to do great things with glass aerosols. For example, they think the glass-pressure package is the biggest perfume-cologne advance in years, largely because it gives a much better "atomization" than do the squeezable plastic containers.

Even a drug manufacturer is researching the aerosol idea—with emphasis on glass and plastics. A company official says: "Cans are too utilitarian in appearance for drugs. They have less appeal to the feminine market. Glass and plastic containers lend themselves to more imaginative design. Also there are only a few major can manufacturers, but there are scores of glass and plastic container companies." This company feels the glass spray container will begin to make great progress in the next few months.

Consumers like the aerosols. They are willing to pay the added price for a product that is easy to dispense. A survey of users of aerosol insecticides turns up these reasons for consumer preference:

- Handy and convenient.
- Produces effective results.
- Gets products to hard-to-reach surfaces and corners.
- Less waste, not messy to use.
- Relatively safe, especially around small children.
- Product lasts longer under tight seal.

Most aerosol items are priced low in the U.S.A. Prices per unit range from 39 cents up to about $1.50—thus the appeal is to the mass market. Container designs are changed periodically by some concerns, for newness and fresh appeal. Color is stressed, too, to give maximum eye-appeal, especially as distribution is handled more and more by self-service retail stores.

Most manufacturers in the U.S.A. who want their products to appear as aerosols turn the job over to "custom packers." There are about 60 concerns that fill aerosols for other firms. They handle around 75% of the trade today.

Custom packers put the customer's product and propellent gas into a container for a service fee of 5 cents or less for each unit, depending on the product and size of the order; the manufacturer pays for the containers, valves, and propellents. In some cases, the packer offers a complete aerosol service. He furnishes all supplies and will even formulate product ingredients. ●

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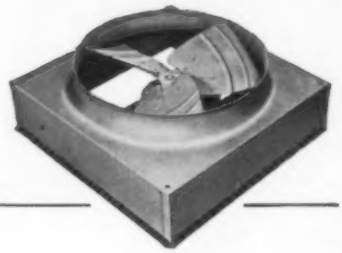

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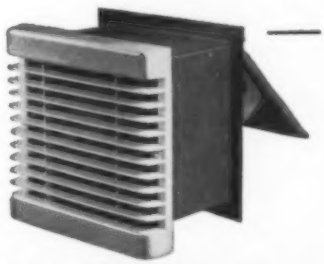

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Customers Test New Products

Digested from CHEMICAL WEEK, June 9, p96

Several companies in the U.S.A. are now using consumer panels to evaluate new products for industrial markets. Corning Glass Works, Corning, New York, is a leading example. The panel idea, say company executives, offers a quick and inexpensive way to test possible products.

The consumer panel, at Corning and other firms, consists of a group of representatives selected from among potential customers in industry. They are asked to critically appraise new industrial product ideas. Their opinions are reviewed long before management commits the company to full production.

Corning incorporates its consumer panel into a broad three-point market development plan:

• **Idea Stage**—Following conception of a product idea, the Sales Department estimates the general business prospects; the Product Engineering department roughs out several alternative designs, estimates performance, production capability, and costs. Management considers marketing organization, patents, and specific production processes.

• **Preliminary Development**—If the product idea survives the idea stage, Product Engineering then consults the consumer panel. Corning's panel members (about 10) are chosen on the basis of lack of prejudice, a "strong sense of optimistic discontent," geographical location, willingness to make a trial, and experience with plant operating problems.

Panelists judge such factors as product merit, limitations, possible improvements, and the price they would be willing to pay. Product Engineering is then ready for the next step—if warranted.

• **Full Development** — Sales, Manufacturing, and Product Engineering cooperate to advance the project toward limited-scale production. Once again, the consumer panel is consulted—this time for evaluations of revised designs, prototypes, packaging, and laboratory tests. A limited-sales phase follows, and then full-scale marketing efforts.

Robert Callard, supervising engineer and contact man for the panel members, cites these benefits from the panel approach:

The method affords appraisal in depth rather than in breadth of a product idea. And it is carried out before large sums are spent for development. Moreover, a close look at end-use can be obtained—first-hand from the user.

The Hermon W. Stevens Agency, Boston, market research firm, is another user of the panel approach. It uses consumer panels to help evaluate its clients' new products. Stevens says the panel member contributes his services free because: (1) He can influence final design and price to better suit his own needs. (2) He gains advance knowledge of new products, and thus gains a competitive advantage in his industry. ●

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Retail Trading Stamps—A Boon or a Burden?

Digested from BUSINESS WEEK, May 19, p43

Forty million families in the U. S. A. have suddenly begun working on stamp collections. This is no philatelist's nightmare. It is an economic fact in the retail trades—though some retailers would agree that it has become a nightmare to them.

In the past year, "trading stamps" have become big business.

Here is how the trading stamp idea works: For every 10 cents the housewife spends at a "stamp store"—her food market, quite likely, though it may be an auto service station, chemist, laundry, etc.—the clerk gives her one stamp. One dollar spent: 10 stamps (or coupons). Most stores buy the stamps from a company that operates a "stamp plan."

When she has filled her stamp book (this generally takes 1,200 stamps) the housewife takes it to a redemption center, usually operated by the stamp company. There she picks an electric toaster, a leather wallet, or some such "gift" from an assortment, and pays for it with her stamps (one or more books, according to the gift's value). On an average, the housewife gets $3 worth of merchandise as a reward for her patience, her stamps—and for buying $120 worth of goods at her favorite retailer.

Her retailer, meantime, has paid somewhere around 2% to 3% of his gross receipts for the stamps. Usually he pays $3.60 for one book of 1,200 stamps—to stimulate $120 in sales. The stamp company furnishes stamps, prizes, and services.

And that leads to the big question that has thousands of retail men arguing these days: Who really benefits from trading stamps? Customers? Retailers? Or just the stamp companies?

The trading stamp—good or bad—has forged ahead in the past year or two because the big food chain-stores—the supermarkets—decided to enter the picture. According to estimates, the stamp business among food retailers jumped 76% in 1955. Today, food stores account for about 55% of all stamp users.

There are around 200 stamp companies in the U. S. A., selling $200-million worth of stamps a year. Merchants, paying 2% to 3% of their gross for stamps, give out stamps on more than $10,000-million worth of goods yearly—conservatively estimated.

Why do trading stamps help retailers move more merchandise? Dr. Bertrand Klass, of Stanford University's Research Institute (California), made a special study. His answer: Stamps make women feel frugal. The housewife gets a luxury "gift" she would not buy for cash, and, says Dr. Klass, has the happy feeling that she is getting something for nothing. The fact that the retailer may have raised his prices enough to pay the stamp company seems to go unnoticed.

Merchants opposed to the trading stamp idea are many—and vocal. They charge that stamp plans are a fraud that deceives the consumer, and that no one profits but the stamp companies. Why, these retailers ask, should a third party — the stamp company — live off our sales? They protest also that the cost of stamps is so high that in many cases the retailer's profit is erased. And they deny that the stamp companies make the "modest" profit claimed—the difference between the $3.60 paid for the single book and the $3.00 (average) value of the merchandise gift. The truth, say these irked retailers, is that the stamp company thrives because it buys cheap merchandise (in big lots), and gets a big windfall on the many stamps that are never redeemed for "gifts."

Those who favor the stamp promotion have one forceful argument: The retailer gets increased volume and traffic in his store. And that is why the big chain operators have, one by one, gone in to the stamp business. ●

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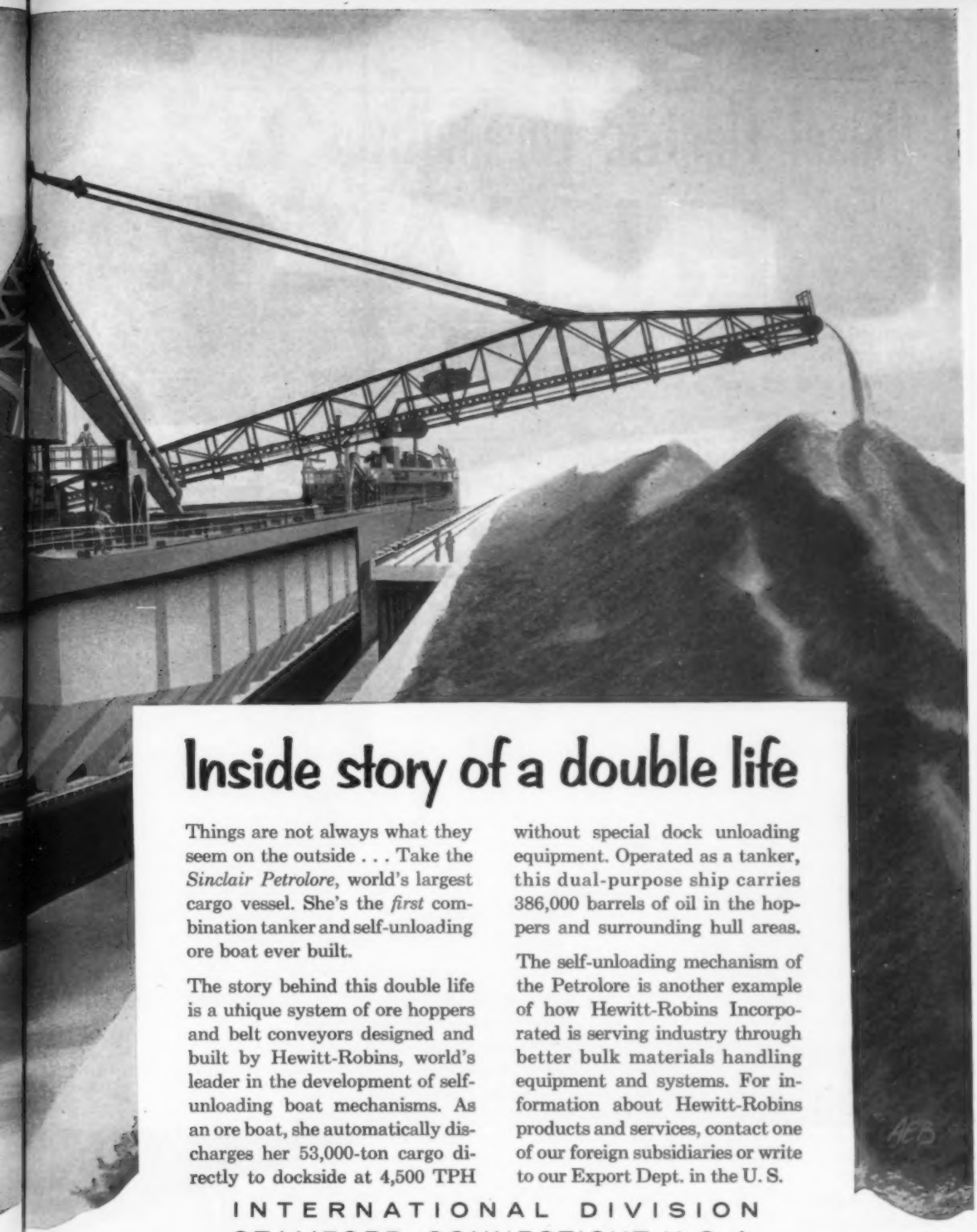

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This is also the most powerful in the world for a narrow gauge locomotive.

It is powered by a single MAN Type V 8 V 22/30 mAuL Engine, with a continuous output of 1,680 HP and rated output of 1,900 HP per hour. It can be used for hauling either freight or passenger trains, at a speed of 55 m.p.h. for a 500 ton train.

42" Gauge, 1,900 HP Diesel Electric Locomotive for the Japanese National Railways

SPECIFICATIONS

Gauge	1,067 mm (3'-6")
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Wheel Arrangement	Co—Co
Locomotive Rating:	
Maximum Speed	100 km/hr (62 m.p.h.)
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FINANCIAL DIGEST

The threat of an "export credit war" between major nations has not materialized. According to recent studies, total volume of export credit granted by exporters in the leading industrial nations has not increased in the past year. Nor have credit terms become more easy, despite claims by disgruntled businessmen that they were being "undersold" by competitors in other lands.

U.S.A. businessmen, especially, were loud complainers. Now they complain less that their capital goods export contracts are being lost to Europeans who extend credit on unreasonably "easy" terms. European terms have tightened up in recent months; and U.S. credit has become more liberal. Usual terms are now 4 to 5 years, on both sides of the Atlantic.

Here are some reasons for this trend: (1) U.S. exporters now find it easier to provide medium-term credit, because of more credit lines extended by the government's Export-Import Bank and the privately-owned American Overseas Finance Corp. (2) Higher money rates in Western Europe has meant less liberal terms to foreign buyers. (3) European companies are building more and more local plants abroad. This means less European emphasis on export credit. (4) Confidential reports of the World Bank by 14 important exporting nations—on the volume of their export credits—are having a dampening effect on the careless extension of credit.

Meanwhile, in West Germany, a once-powerful figure in international finance, is urging more credit for German exporters. Dr. Hjalmar Schacht, former president of the Nazi Reichsbank, wants German Federal bank reserves and Treasury surpluses put to work to speed up payment of German debts abroad; to provide more credits for the export of capital goods; and to purchase bonds issued by overseas customers of Germany.

One important new development may be bothering Schacht, as well as other businessmen. It is the appearance of the Communist competitors—with liberal credit offers—in world capital goods markets (MD, May).

✦ ✦ ✦

The British government has just put a spotlight on "lottery financing" by approving a new bond issue. A savings bond will have the incentive of lottery prizes, instead of regular interest payments. The interest ordinarily paid will be set aside in a prize pool which will be divided among a lucky few. Pay-off will amount to 4%.

The hope, of course, is to make government bonds more salable and to encourage savings—and thereby discourage inflation. The idea is being given some clever twists by European money managers.

In France, for example, there is a bond issued by the national railways that promises the buyer a chance to win free transportation. In Sweden you can now buy government lottery bonds on the installment plan—for a service charge. And the Swedish government sells bonds through a leading publisher, a big department store, and a mail order house. Denmark claims to have the only regular, "floating" bond lottery—drawings for the lottery are made throughout the land, week to week. Italy, Greece, Belgium, Norway, Finland—all are using the lottery bond idea.

In France, a new version of the "inflation-proof bond" is on the market (MD, April). The loan guarantees at least 5% interest—but is subject to annual increases that are tied to the gross national product of France. Officials believe that the economy will grow enough in the next decade to justify a return of 8.65% the 10th year.

✦ ✦ ✦

The World Bank (International Bank for Reconstruction & Development) has passed its 10th anniversary.

As if to celebrate, the bank completed its two biggest loans to date: One is an $80-million credit to help finance a dam and electric plant on the Zambezi River in the Federation of Rhodesia and Nyasaland in central Africa. The other is a $75-million loan to expand steel production by the Tata company in India. Loan volume for the bank's 10th fiscal year amounted to $420-million—$10-million over the fiscal year ended a year ago. The total since 1946 is over $2,500-million.

The bank's interest rates have been raised from 4¾% to 5% on loans over 15 years, and to 4¾% (from 4¼%) for shorter terms. Earned surplus is up from $85-million to $226-million in the past 4 years.

The International Finance Corp., proposed new affiliate of the Bank, has 25 countries signed to membership—will soon have the required 30. Subscriptions now total $64-million. Purpose: to stimulate private international investments in member countries.

Consensus of opinion: The World Bank has far exceeded expectations of its founders at the close of World War II. And its prospects for the next 10 years seem excellent.

Financial Digest, compiled from various sources, analyzes current financial trends and underlying factors.

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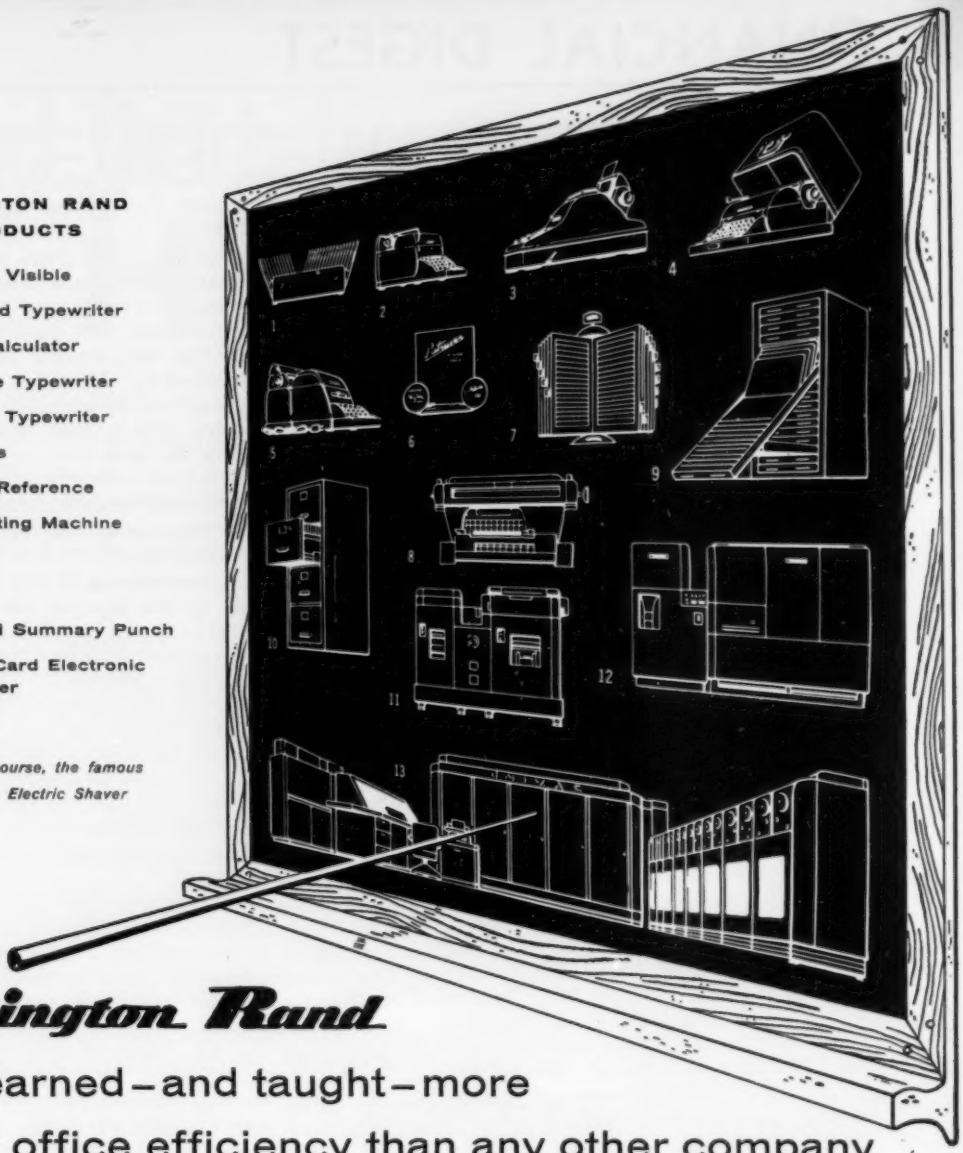

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has learned–and taught–more about office efficiency than any other company

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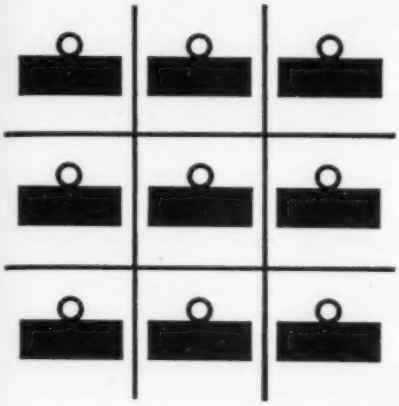


A New Approach to Office Management

The office has become the vital control center. It produces information management must have to make fast decisions required in modern business.

Efficient office management presents an urgent challenge to businessmen. Those who ignore it do so at the peril of their profits.

Here, MANAGEMENT DIGEST presents a common-sense approach to your office—and the problems of personnel, paperwork, and mechanization.

The focus is on the office. Suddenly businessmen the world over have found themselves riding on top of a vast revolution in clerical practice. They find the riding rough, too.

The reason is simple: Management men are woefully unprepared. They wish they could ignore the revolution and go back to the day when offices languished in dust and office procedures revolved slowly like the old fashioned overhead fan. But that day is past.

Businessmen today are facing three rather frightening facts:

• **The office is taking a place of vital importance in all competitive industries.** It is the new nerve center of control. The emphasis now is on paperwork, reports, analyses, forecasts. The fast decisions necessary in today's competitive business world are more and more based on knowledge that comes only from efficient office operations. Indeed, the quill pen and green eyeshield are being replaced by new ideas, by new working procedures—and by new equipment.

In 1920, only 7% of all jobs were clerical. Today, the figure is probably over 25%—and growing fast. That leads to the second fact that is worrying management men:

• **Office costs have gone sky-high.** Businessmen can no longer buy stamps and letterheads from petty cash, and support a handful of clerks with routine funds. And, not only are paperwork requirements

causing a flood of office activity and expense, but they are causing it in a department of business that always seems uneconomic. Offices are only 50% efficient—at best. And paperwork, the raw material of office operation, is at least 30% pure waste. In the U.S.A., for example, this means billions of dollars thrown away each year.

Top management people are still not fully "sold" on the idea of streamlining the office. They are fighting high office costs—and yet are demanding more and more paperwork from their office. In most cases, it is a losing battle against expense and inefficiency. Now businessmen are beginning to realize that they know little about the "new office" and how it should work. Thus, looms the third factor:

• **Management men are shocked to discover that even if they want to adopt modern methods, they simply do not know the techniques.** A few experts and a few companies know; but most businesses in even the highly industrialized countries are largely ignorant of techniques such as work measurement, work flow, work simplification, integrated data processing, and many related policies and practices.

As for "office automation"—and all that that implies—management men are downright frightened by it. They either shun "automation" like the plague and pretend they are satisfied with their operations, or they get flustered and impulsively order expensive machines that they may or may not really need, or at least are not prepared for.

These, then are the problems. And however confused he may be, and weary of all the talk about "updating the office," the businessman must review his operation. If he closes one eye and concentrates entirely on the sales force and the factory and the laboratory, he is apt to do his business great harm.

To succeed and expand in an age of keen competition, the average business desperately needs to adopt the "information center" concept of office operation. The solution will vary from company to company, industry to industry. One thing is sure: Much of the skill used to operate the production end of the business can, and must, be applied to office organization and operation. The only requirement: Some patience, some hard work and, most of all, common sense.

1. Finding a Forgotten Man

There is a forgotten man in industry. He is loyal, hardworking, reasonably productive. He is being given greater responsibility day by day; but he is stymied by lack of authority—and usually gets paid a lot less than he earns. He is the office manager.

Consider his lack of authority when it comes to purchasing new equipment. This gives a fair picture of his frustration. In a recent survey made by *Purchasing* magazine (U.S.A.) it was found that in most companies the purchasing department, not the office manager, has authority to buy office equipment. The questionnaire covered 41 equipment categories, ranging from carbon paper to calculating machines. 50% or more of the office managers had full authority in only four of the 41 categories.

An executive of a leading American office equipment concern says this: "We try to sell a machine. Who do we talk to, the man who knows the job that has to be done—the office manager? No. We talk to the fellow who can spend the money, usually an official who knows nothing about the office end, machines or systems. We sell him—but it's hit or miss."

Not only should the office manager be upgraded in terms of authority and compensation; he should "upgrade" himself, too. He should elevate his skills and broaden his knowledge of the whole business. He will have to start to think and act like an executive, not a supervisor.

The point is that the office manager is fast becoming a key man in business administration, whether he likes it or not—and whether top management likes it or not. In a sense, he is becoming—or should become—his company's management consultant on administrative problems.

The products that are produced in his department—forecasts, analyses, reports—are the indispensable tools of modern management. These paperwork products can be produced with speed and accuracy only if the "paperwork manager" is highly skilled, and has prestige and authority.

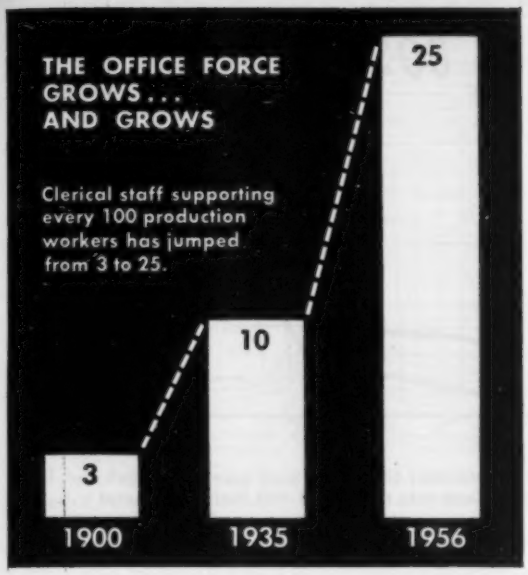
Christian Jarchow, vice president of International Harvester Co., had this to say before a recent meeting of the U.S.A.'s Office Management Association:

"The office manager makes it possible for management to know where the business stands at the moment, where it seems to be going, and what factors are influencing the trend. His office is both an operations center and an information center. He is the managerial person who is closest to the basic data of the business.

"We expect him to keep himself currently informed on company policies and objectives. He must know our products. He must be concerned with our relationships with employees, customers, share owners, and the communities in which we do business.

"The office manager today must recognize that despite short cuts in office procedure and the increased use of mechanical equipment, there is a constant increase in paperwork and clerical costs. He will be hard pressed to find ways of cutting his costs. Perhaps the most promising are to discontinue preparing unimportant data, to streamline certain precedures, and to use more efficient office equipment."

Clearly, modern business is demanding of the office manager much more than foreman-level ability. It asks for a man of executive talent with a wide knowledge of all major operations, from personnel to production. In a large business the individual who fills the position might be a top management executive, perhaps an administrative vice-president. In a very small business, upgrading the office manager



might mean simply that the owner-manager of the company broadens his own job to include reorganization and supervision of paperwork.

Be the company big or small, the job of building up the office is essential. This may or may not involve more personnel and more mechanical equipment. It will definitely involve an upgraded manager with full authority to direct the people, the equipment, and the processes that comprise "the office."

2. Investment in People

Imagine spacious, air-cooled offices, with the very latest in comfortable furnishings and automatic conveniences; easy-to-walk-on rubberized floors; tinted windows to filter the sun's glare; a low-cost cafeteria, always open; a reading and game room; outdoor terraces—even arrangements for the use of a swimming pool.

The company that installed all of this is convinced that such office expense is more than just a boon for the workers, and an impressive sight for business visitors. The company president explains: "It is a profitable investment. It is absolutely necessary in our line of business where we depend so completely on specialized clerical people. Just recently I heard of a competitor of ours that plans to buy a small country club for its office force, golf course and all."

You may marvel at the company's concern for its office workers. But it is no idle story. Growing businesses in all nations are pressing ever harder in their efforts to acquire and retain more skilled office workers. Extra benefits, like those noted above, are part of the trend.

Thirty years ago, one office worker supported a dozen or more workers in the plant. Today the ratio is something like one-to-four, depending on the line of business. And businessmen who thought, all along, that new mechanical equipment would turn this trend, are learning that they need more than just machines to lower office costs.

Automation in the office, far from a cure for personnel problems, is actually increasing the demand for skilled people. True, in many cases, routine clerks can be replaced, or shifted to other more productive jobs. But this is offset by the fact that it takes more highly trained people to operate a "mechanized" office than a manual office.

Thus, the emphasis is on, first, upgrading the office manager; second, more careful recruitment, selection and training of office personnel; and third, on higher salaries and more extensive extra benefits for office personnel.

Salaries are way up. For example, salaries in 24 selected clerical categories in the U.S.A. and Canada went up an average of 50% from January 1947 to September 1955.

About 90% of the concerns offered overtime wages to office workers. Well over 90% have a 5-day workweek; provide free (or partly free) hospitalization and group life insurance for office employees; give 9, 10, or more paid holidays a year.

The "clerical director," and office management executive, of a large New York concern employing mainly office personnel sums up the situation this way:

"Management must do more for the office clerk than pay a living wage. Competition for semi-skilled people is serious; competition for highly trained people is awful. Management must pay competitive wages, offer all sorts of side inducements, and must create an environment that will attract young people out of school. Training in advanced clerical skills, especially in machine techniques, is a big problem. Supervisory training must be pushed hard—indeed, you must start by upgrading the office manager.

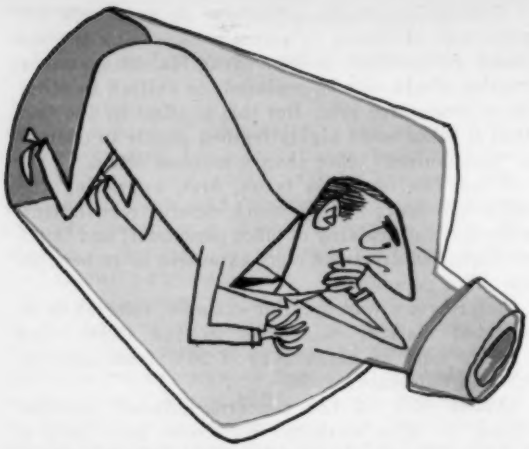
3. An Approach to Efficiency

Many methods developed in the factory can be applied to office operations. A general approach to improved efficiency can be applied. So can some specific techniques, like time-and-motion study, and work-flow analysis.

This does not mean that total office operation can be reduced to a factory-like routine. The modern office—the information center and control center of business—goes far beyond routine chores. Still, many of its clerical operations are repetitive and can be measured and controlled.

The businessman who would apply his production engineering experience to the office must remember the human side—the fact that office people are different from factory people. The "white collar man" usually thinks of his job as somehow related to the management end of the business. He (or she) is apt to be offended and frustrated by any sudden assembly-line approach to office operation. For example, he may deeply resent a mechanical measurement of his work output.

The office force must be skillfully prepared for any major changes in procedure. Here again, the office manager is key man. He must make clear to his staff, above all, that a revision of methods will not mean the permanent displacement of any



THREE STEPS TO EFFICIENCY: "Study each clerical job. Concentrate on finding bottlenecks. . . .

. . . determine the cost of each operation. High cost jobs will stand out; the reason will become apparent . . .

worker, though it may mean a different job. Occasionally, new highly automatic equipment may make a reduction in staff necessary. In this case, every effort must be made to reduce the workforce gradually in the course of normal turnover. It is up to the office manager to explain clearly that new methods, in the long run, will mean better jobs for the entire office force.

There are many approaches to clerical efficiency. One broad and basic approach is a five-point program that can work in any office, small or large. It was recently described in an address before the National Office Management Association (U.S.A.) by John Crowley, an expert in systems and procedures:

• **Study each clerical job on the basis of smoothness of operation.** Concentrate on finding bottlenecks that may be interfering with the over-all flow of work.

• **Determine the cost of each separate operation.** Study the man-hour requirements of each; then estimate money costs per day or week or month. High cost jobs will stand out; and usually the reason for excessive cost will become apparent. To find out, trace the job from its beginning, and follow it through the business—whether it be a sales report, a balance sheet, an accounting process, a filing process.

• **Evaluate the actual need for every report.** What would happen if it were eliminated?

• **Determine manpower standards.** First, measure the volume of work performed on each operation and try to set a realistic standard for performance. Then measure the productivity of each group of workers at regular intervals by comparing performance with the standard.

Standards can be set in several ways. One way is to compare standards of other companies. Or they may be available through local management associations. If the standards involve machines, the office equipment manufacturers will usually furnish simple time standards for operators. Rough standards can be based on past performance in one's own office. Where output of a certain group has varied from, say, 1200 units a month to 1900 units, a reasonable standard to follow might be 1500 units.

• **Encourage maximum effort by employees.** Provide a comfortable working area, modern, easy-to-use equipment. Here, the office manager's ability to deal with people is all-important.

Such a program, if carried out thoughtfully, will greatly reduce office inefficiency, duplication of effort, confusion. The very fact that management shows it is serious about methods improvement will give the office force a start toward tightening up wasteful methods.

Once the office system has been revised—at least to the extent that performance standards have been established—the problem becomes one of control. How can management follow what is being done in the office, and at the same time enforce its newly established job performance standards? Here are some suggestions reported in *American Business:*

(1) Use colored tabs on paperwork (such as incoming orders) to differentiate work asigned within weekly periods; then the supervisor can easily notice work carried over into a new production period. Keep all work on desks; protect unfinished work against being misplaced or buried carelessly in a drawer.

(2) Set up weekly "production" reports covering finished work, work in progress—like factory managers do. Set up a system of priorities for paperwork. Do not let all reports compete with one another for clerical man-hours on an equal basis. At least differentiate between statistical and control reports.

(3) Though you may feel your office routine is well established, and your performance standards are as "tight" as possible, concentrate on cutting away the petty details and non-essentials. Continue to review work routines, bearing in mind any possible new applications of machine methods, and points where further standarization is possible.

(4) Control the flow of work. "The greatest single control over clerical man-hours," says *American Business* "consists of the flow of work to minimize fluctuations between overloads and periods of idle-

. . . evaluate the actual need for every report. What could happen if it were eliminated? Would anyone miss it?"

ness. Instead of staffing the office to meet peak volume and attempting to justify the personnel by 'fill-in' tasks on low-volume days, regulate the flow of work so that the overburden of one period is carried over to periods when demands are less."

How successful are stenographic pools? This is where secretarial services, especially typing, are performed by a group of office girls working in a separate service department. The big change, of course, is that executives and supervisors give up their private secretaries. So do small departments that would normally have just two or three typists to carry the workload.

A recent survey of 79 representative companies points up some interesting facts: Of the 79 concerns, 27 have stenographic pools. Nine others are planning pools. It was generally agreed that a company must have at least 10 people who regularly dictate letters to make a pool economically worthwhile. Several firms use the pool as a training ground for beginners, or for low-aptitude workers.

Eighteen of the 27 companies agreed that a pool helps overcome the shortage of trained stenographers. All 27 agreed that the quality and quantity of the pool's work is "satisfactory," and that costs are substantially lower.

The big advantages are mechanical and financial. The big disadvantages are intangible. The executives and supervisors who lose their private secretaries resent the pool idea. They think they lose stature in the company—which is a truth generally conceded. The secretaries, too, feel "lost" in an impersonal service department. They tend to lose interest. Their work is apt to descend to a rather "colorless" level.

"With the pool," says one systems expert, "it's a question of money or morale."

Overall, a methods improvement program—with emphasis on cost reduction, work measurement, and job performance standards—can produce a wide range of benefits. Two big requirements are: (1) The company must carry out the plan to its full extent, going beyond superficial changes in organization (like giving the office manager a new title and rearranging the chairs and desks). (2) The mechanical approach must not interfere with good morale among the workers.

4. The Problem of Paper

Consultants these days earn a handsome living just by showing businessmen how to clean up their files. Letters, surveys, reports, plus a thousand miscellaneous documents, threaten to engulf top executives in facts, figures, and frustration.

To the top executive, "paperwork" means a desk piled high and decisions slowed by laborious reading. He can but hope to cut down the number of reports that reach his desk, and try to simplify those that do reach it.

Look at paperwork from the office manager's viewpoint. On his level—and after all, he is the company's chief paperwork officer—formal efforts are made by some companies to control quantity and quality. The two chief techniques are called "forms control" and "records management."

Forms control means simply a formal plan to cut down the number of paper forms used in a business, and to simplify those remaining. Alven Ghertner, an American business forms expert, recommends a simple system for control:

First, says Ghertner, obtain a copy of every form used in your company. Note the department using each one. Include all forms—temporary, permanent, those printed in the office on duplicating machines, those commercially printed.

Second, classify the forms according to the number used each year, and the function of each. Because many forms have more than one function, all functions must be listed. After classification, it should be easy to eliminate inefficient and obsolete forms, and to combine those that overlap.

If you have decided to put forms control in the hands of your office manager—and this is the logical approach—then have him review, personally, all proposed new forms. In reviewing, he should bear in mind these principles:

- Keep the basic purpose of the form in mind, and try to eliminate much of the unnecessary data that clutters most paperwork. This will save time for every worker and executive who handles the form, and will cut paper and printing cost.
- A form design should enable a worker to fill in information easily in logical order.
- Forms should be easy to read, simply worded. Remember, not only executives read them; file clerks handle them, too.
- They should be designed for cheap printing; should be given a form code number for easy filing; should be sized for typewriters; should have instructions on the front side at the top; should be considered for color coding.
- If possible, forms should be ordered from the printer once a year. This enables the printer to produce cheaper in big lots.

Correspondence costs can be cut by using "form letters" in many cases. Standard form answers to certain types of correspondence, and standard originating letters, made available to each stenog-

"Of all your present records probably 35% can be destroyed . . ."

rapher, can cut down labor costs. One office found that 85% of its correspondence could be answered with six simple form letters. Another concern uses printed postcards with checkmarks to indicate the appropriate message. These are used to answer queries where the curt, impersonal reply is not offensive.

A clerk can handle as many as 10 form letters or cards in the time it would take to answer by one individual letter. This is an example of forms being expanded instead of contracted in a business, to save time and money.

Records management begins with an inventory of all existing records and ends with a simple control procedure to suit your company's needs. One thing is sure: you end up with far fewer records than before—assuming the program is given reasonable support by top management. You save labor, floor space, and many headaches if you follow through with the idea.

If your company is like most, the results of a records inventory can just about be stated in advance:

- Of all your present records—in filing cabinets and elsewhere—probably 35% can be destroyed without the slightest risk or threat to efficiency.
- An additional 30% can—and should—be transferred to less costly space. For example, one large firm found that 90% of all requests for records were for those less than six months old. Only 1% called for material more than a year old. Storing inactive records in a secondary location—maybe a warehouse—will reduce costs materially. Consider photographing them on microfilm. Remember: every record thus stored frees some valuable space.
- Of the 35% now remaining, about 20% will lose their value within a fixed period.
- Of all your present records, probably less than 15% will need to be kept permanently.

Surely there is need for action when nearly two-thirds of all records kept by the average company are kept either unnecessarily or in the wrong place. Unnecessary records tend to absorb income, yield no return, and hinder the use of necessary records. In the average company they can consume between 10% and 40% of the total money spent on sales and administrative costs combined.

Records management usually involves these steps—again a logical part of the office manager's total job: (1) An inventory and analysis of all records. (2) A classification into current files, storage files, and records to be destroyed. (3) The setting-up of a central authority to control all files in the company.

If the company is small, a "records clerk" can be appointed, and furnished with a list of instructions for the systematic disposition of all major types of records. If the company is large, a separate "records department" may be necessary. The key to records management is the systematic handling of an office element that most concerns have ignored for years.

5. How Much Automation?

Office mechanization—which is just a streamlined way of saying "more machines to do the routine work"—is nothing mysterious. It is as complex and as expensive as one wants to make it—no more, no less.

There are two important points to remember:

- Modern mechanization can be applied by the large, the medium-size, and the small business. The machines can be relatively cheap and simple or expensive and elaborate, depending on the size of the operation and on how much the business can afford to invest.
- Integrated data processing, the basic concept

CLEANING OUT THE FILES

A records management team at Reynolds Metals Co. began screening 40,000 accumulated file drawers, binders, cases. Of the total . . .

- **36%** were permanently destroyed
- **38%** were stored until end of "retention" period
- **4%** were permanently recorded on microfilm
- **17%** were stored permanently
- **5%** remain to be disposed of

THE SAVINGS:

- 23,040 square feet of space was freed
- 397 tons of waste paper destroyed or sold
- Hundreds of file cabinets open for future use
- Thousands of dollars in manhour savings yearly

of office mechanization, is an idea, not a machine. You can benefit from the idea without spending a pfennig on new equipment.

An executive of one of the world's largest office equipment concerns—a man who serves the small businessman, as well as the big company—had this to say to MANAGEMENT DIGEST.

"We want to sell machines, of course. But to do that we have to sell a idea—a system—to the businessman. If we can show him how a system will fit into his office and speed up operations and save money, then we have created a buyer.

"Take integrated data processing. It is the big new trend for the automated office. But basically it is simple. For example: Suppose I have a sales force of 60 men, spread over a wide territory. Each salesman sends in to the office perhaps a dozen different types of communications—regular orders, rush orders, requests for literature, credit letters, several kinds of reports, and so on. Each morning the office mail box is loaded with an average of 120 pieces of mail from the sales force.

"Now suppose I have a chief assistant and six staff assistants in the office. Each of the six assistants specializes in handling certain types of communications from the sales force. One handles new orders from districts A to M; another handles orders from N to Z, and so on.

"Each morning my chief assistant opens the sales force mail, and sorts it into seven piles—one for each of the staff assistants, and one for himself. He takes out any special communications that require some unusual decision. These he handles at his discretion, or passes on to me if the case goes beyond his authority. The great bulk of the work is then handed on to the six clerks to be handled in a routine manner. This, in a simple way, is an example of what we mean by 'integrated data processing.' In IDP you take a big volume of paperwork and process it through a central point in a fixed, routine manner."

You proceed from there with new equipment. In a small company you might simply make up standard printed forms for the salesman and install an efficient file-card system in the main office. You might equip each of your six assistants with a semi-automatic circular file. Where you needed faster work, you might install an electric typewriter.

In a big office you could have all incoming information handled only once by human hands—have it punched into code cards by a typist. From there on the machines could take over the processing of the paperwork—sorting, filing, creating new copies, tabulating. The ultimate would be an electronic computer that could be fed information from a punched tape and then evaluate the information, to create statistics, reports, and analyses.

Planning is the big problem, when it comes to adoption of office mechanization. Each businessman must decide for himself how far along the road toward automation he should go. That decision can be a sound one only if top management has devoted a lot of time, and a lot of common sense, to the problems of his office. ●

More About the Office

You may want to learn more about office organization and management. Talk to your associates—they may have good ideas not yet brought to light. Talk to colleagues in other companies, and in your trade association. Get in touch with management groups and associations. Seek advice from office equipment manufacturers. And be assured that MANAGEMENT DIGEST will do its best to present, month by month, useful new ideas about the office.

Should you want to read more about specialized office problems, here is a sampling of current books available.

Office Management Series, published by American Management Association, 1515 Broadway New York 36, N. Y.; "Human Side of the Office Manager's Job," No. 134, price $1.25; "Streamlining Office Equipment and Services," No. 135, price $1.25; "Controlling Office Production," No. 140, price $1.75; "Improving Office Reports, Manuals, and Records," No. 141, price $1.75.

Office Managers' Library, McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y.; $27.50—also available separately: *Design and Control of Business Forms, A Textbook of Office Management, Manual of Practical Office Short Cuts, Records Management and Filing Operations, Business Organization and Practice, Technique of Administration.*

Modern Office Management, by C. L. Littlefield and R. L. Paterson; Prentice-Hall, Inc., Englewood Cliffs, New Jersey; price $9.00.

Management Techniques In The Smaller Enterprise; British Institute of Management, 8 Hill St., London, W. 1; price 2s. 6d.

How To Increase Office Productivity, by Earl Strong; Trico Service Co., 1337 South Garner St., State College, Pennsylvania; price $2.75.

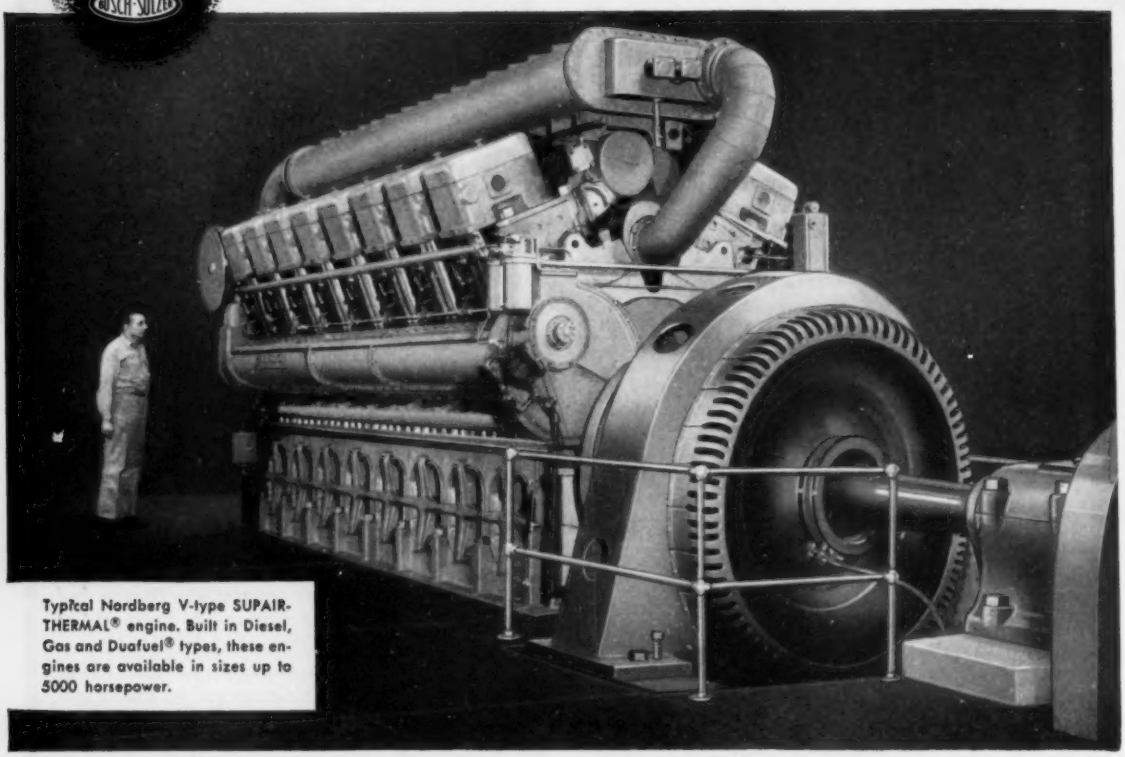
Records Management; National Records Management Council, 55 New Montgomery St., San Francisco 5, California; price $2.00.

Manual Of Business Forms, by Wallace Sadauskas, Office Publications Co., 232 Madison Ave., New York 16, N. Y.; price $2.00.

Progressive Filing, by Gilbert Kahn and Theodore Yerian, published by McGraw-Hill Book Co., 330 West 42nd Street, New York 36, N. Y.; price $3.00.

Office Automation by R. Hunt Brown, published by Automation Consultants, Inc., 1450 Broadway, New York, N. Y.; price $12.50.

...pioneers in power generation!



Typical Nordberg V-type SUPAIR-THERMAL® engine. Built in Diesel, Gas and Duafuel® types, these engines are available in sizes up to 5000 horsepower.

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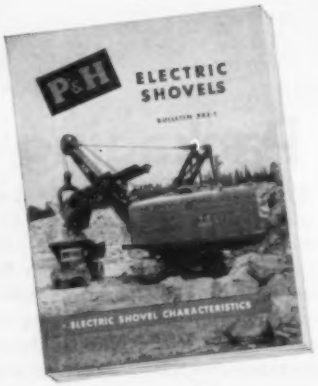
Why is P&H *at the head of the Big Three?*

MAGNETORQUE* and ELECTRONIC CONTROLS give operators the only modern electric shovels



For a clearly illustrated description of Magnetorque* and how it sets a new standard for electric shovel design and operation, write for Bulletin X-156. Other booklets available on electric shovel models from 3 to 10 cu. yd. capacity. A copy of these publications will be sent those who request it on their company letterhead.

These revolutionary advances in design and performance of electric shovels are just two of the reasons why operators and owners are pointing to P & H for their outstanding achievement in electric shovels . . . why P & H now is at the head of the Big Three . . . why P & H can promise you the only modern electric shovel.

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For complete information, call your P & H representative. Electric Shovel Division, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

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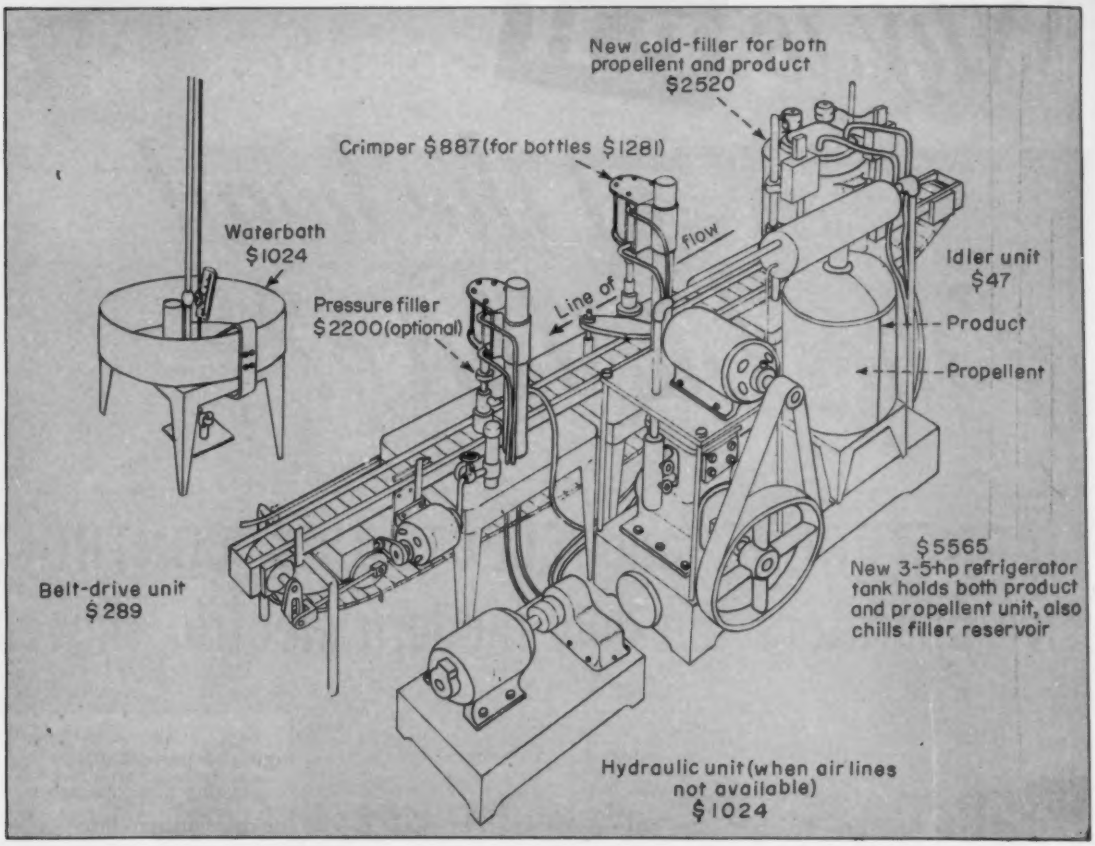
New cold-filler for both propellent and product $2520
Crimper $887 (for bottles $1281)
Waterbath $1024
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Belt-drive unit $289
$5565
New 3-5-hp refrigerator tank holds both product and propellent unit, also chills filler reservoir
Hydraulic unit (when air lines not available) $1024

New Machine for Aerosol Packaging

This aerosol products filling line is able to automatically fill up to 60 containers per minute. The line comes complete with refrigerator, can be adapted to either cold-fill or pressure-fill. It will handle cans or bottles—of nearly all the new aerosol products now coming to world markets (see "Marketing," on another page in this issue).

The new line is the manufacturer's (a leading proponent of cold-filling) answer to the low cost theme stressed by pressure-filling advocates. Depending on the type of equipment and its capacity, lines cost from $10,000 to $12,000.

Helping to reduce cost on the new line are two new developments—a self-contained refrigeration unit for cooling both propellent and product, and a two-in-one cold-filler (using the firm's patented "electromatic" principle). In their small sizes, both refrigerator and filler have a single, partitioned reservoir in which to chill both propellent and product.

In addition to being low in cost, the new line is compact and easily installed. All the components of the system are less than 6 feet high, and can be unlatched easily from adjoining equipment for moving. The new cooler (smallest, 3-5 horsepower) occupies about 6 by 2½ feet of ground space; it would fit easily behind the cold filler and crimper (see illustration). The over-all length of the line illustrated is about 14 feet; over-all width is about 2½ feet. A small hydraulic unit, to operate the crimper and other units when compressed air lines aren't available, can be placed behind the filling line, too.

Filling capacity varies widely. With 16-ounce cans, the line shown can fill 10 to 20 per minute; 15 to 25 12-ounce cans; 20 to 30 6-ounce cans; and up to 40 bottles per minute, depending on the amount of product and propellent going into each can. Other, slightly larger, systems—with larger refrigerators—can boost production well above this.

Although the manufacturer does not build the refrigeration portion of its line itself, it distributes the complete system.

The new lines won't be for the giant firm, or for the big contract packager. But they do give the smaller cosmetics, food, or other specialties firms an opportunity to install a reasonably high-capacity, economically operated cold-fill line at low cost. **(Mojonnier Associates, Inc., 9151 Fullerton Ave., Franklin Park, Illinois, U. S. A.).**

It's all among friends

Newport News is a friendly Virginia seaport town where the bankers, foreign consuls, shipping, and Chesapeake and Ohio Railway folks all know each other—generally on a first name basis.

If you are used to big-city procedures, you'll be surprised how fast things get done at Newport News, Virginia, where rails and water meet. It's a revelation to see how quickly your documents can be processed for bank delivery and collection, or other handling if desired.

But while Newport News, Va. (on Hampton Roads) has the intimacy of a small city, it also has the advantage of a big harbor. Hampton Roads ranks second among all American ports in number of sailings.

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There's an ANTARA model to meet every need:

ANTARA **O-M**—For materials up to 16" wide (41 cm), at speeds up to 30' (9.14m) per minute. This desk-top model has all the features of larger ANTARA machines, except width of copy.

Streamliner 400—Reproduces prints on sheets or continuous roll stock up to 42" wide (107 cm) at speeds to 24' (7.3m) per minute. Synchronized printing and developing. Convenient front delivery of copies.

Printmaster 810—Unmatched for large-volume production. Handles materials up to 42" wide (107 cm) at speeds to 40' (12.2m) per minute. Printing and developing are synchronized. Front or rear delivery of prints. Larger model Printmaster takes originals up to 54" (137cm) wide.

Bambino—No larger than a typewriter, this amazing machine produces up to 200 copies an hour on 9" sheets (23cm) or from 8 to 10' (2.5 to 3m) per minute on continuous roll. Low in cost, extremely economical to run.

Find out how you can benefit with ANTARA. For free information, write Antara, Diazo Division, General Aniline & Film Corporation, Johnson City, New York, U.S.A.

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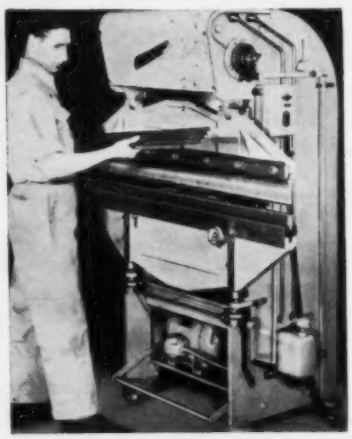
Interoffice Communicator

Intercommunicator MKIII comprises a six or twelve station loudspeaking master unit and the required number of extensions. The master unit is contained in an attractive walnut cabinet, with cream plastic front panel and molded escutcheon. It is both transmitter and receiver—no hand microphone is necessary. Contact with any extension or combination of extensions is by key switches.

A compact adaptor fitting underneath a normal telephone enables telephone conversations to be received over the loudspeaker and replies can be transmitted by operation of a touch bar. **(Hadley Telephone & Sound Systems, Ltd., Cape Hill, Smethwick, Staffs, England)**



Hydraulic Press Brake

The most practical length of stroke for each job can be preset on a new line of hydraulically operated press brakes. The shortest length of stroke usually gives greatest production efficiency and safety for the operator.

The ram of the press brake is mechanically linked to a cam shaft which is turned by power being applied to a rotary hydraulic cylinder. The oscillating action of this cylinder has a maximum movement of 270°. Any length of stroke can be secured with adjustment of a special stroke control selector, without having to readjust the bed or die settings. **(O'Neil-Irwin Mfg. Co., 650 8th Ave., Lake City, Minnesota, U.S.A)**

Analyzes Auto Engine Ills

An electronic engine analyzer locates automotive engine troubles in only a few minutes. When connected to a car engine by two clip-on leads, the instrument shows simultaneous waveform presentations of the behavior of each cylinder of the engine. The condition of the capacitor, spark coil, and plugs can be determined from the waveforms. **(Allen B. Du Mont Laboratories, Inc., 750 Bloomfield Ave., Clifton, N. J., U. S. A.)**

●

New Vacuum Cleaner

The No. 65 heavy-duty vacuum cleaner features light weight, mobility, and power. It is equipped with its own specially-designed 1¼-horsepower motor. The cleaner can remove rapidly up to 3¾-gallons liquid or ¾-bushel dry material before emptying is needed.

Two large 8-in rubber wheels and a caster in front permit easy rolling as well as stability when moving over rough floors. A locking device on the caster holds the machine stationary when desired. The hose, made of Neoprene, is tough enough to pull the cleaner behind it, or when the cleaner is made stationary, to stretch out in all directions to a full 15 feet. **(Black & Decker Manufacturing Co., Towson 4, Md., U. S. A.)**

●

Push-Button Duplicator

A remote control regulator, which can be mounted on an offset duplicator or across the room, governs all workings of the duplicator that would normally require an operator. Once the machine is loaded, the operator sets the regulator for the number of copies needed and pushes a button.

The machine turns itself on, paper rises into feeding position, ink and moisture begin to flow, cylinders turn, and finished copies begin rolling out at the rate of up to 8,000 per hour. When the correct number of copies have been printed, the machine turns itself off. **(Ditto, Inc., 2239 Harrison St., Chicago 12, Ill., U. S. A.)**

For Industry's Jobs . . .

. . . Electric Blankets

While their greatest use will probably be in molding and heat-curing operations, new Us-kon electric blankets can be adapted for such varied work as melting ice, warming food and incubating eggs. Some uses include:

Furniture: For attaching veneer and other glue-curing jobs, the blankets can be nailed to the press frame (pictures). This eliminates the need for wiring special heating coils into the frames.

Plastics: The blankets can often cut down the time needed to laminate plastics.

Warming pipes: In industries where viscous materials flow through piping, the blanket heaters can prevent clogging.

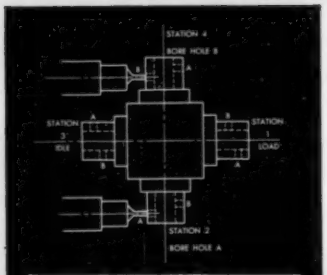
The blankets are made of laminated rubber and can be heated up to 220°F. **(U. S. Rubber Int'l. Corp., 161 E. 42nd St., New York, N. Y., U. S. A.)**

New Entry Among Off-Highway Hauling Trucks

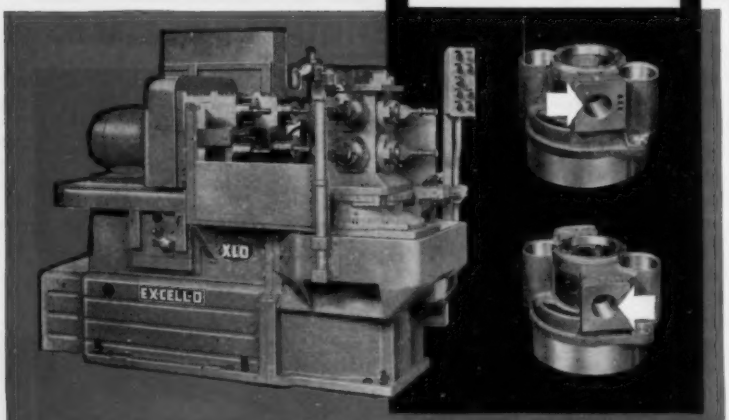
Two new off-highway rear-dump trucks—the 18-ton and 24-ton Payhaulers—are said to have greater horsepower to payload-weight ratio than other off-highway trucks. Main frames are designed for longer life, reduced maintenance cost. The two models of Payhaulers are the result of testing in construction, mine, quarry, and other field applications. They have 125-gallon fuel tanks to help reduce down time for refueling, and are also equipped with tubeless tires and have full-power hoists. (International Harvester Export Co., 180 N. Michigan Ave., Chicago 1, Ill., U.S.A.)

BOOST PRODUCTION, CUT COSTS WITH

Ex-Cell-O Precision Way Machines



Plan view shows all four stations. Spindles are set off center to the fixture to machine cylinder bores A and B which are in different planes.



The Style 54 One-Way Machine equipped for boring, counter-boring and chamfering operations on compressor crankcases. The station nearest the push button panel is the loading station. Loading is done at this station during the machining cycle. On parts shown at right, the arrows indicate completed cylinder bores, emphasize difference in plane.

Ex-Cell-O machines are continually proving their ability for high production on many types of precision operations. One example is this standard Ex-Cell-O Style 54 One-Way Machine which bores, counterbores and chamfers compressor crankcases for refrigeration manufacturers.

Precision and high productivity at low cost are traditional features in all Ex-Cell-O machines; features which have persuaded leading manufacturers to rely on Ex-Cell-O for over 30 years. For full information on how Ex-Cell-O can help you: write or cable Ex-Cell-O in Detroit.

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V-8 Engines Supply Power for New Trucks

A new "V-line" of heavy-duty trucks, with three new V-8 engines, is now in production.

Nine series of trucks in conventional and cab-over-engine, four- and six-wheel design, comprise the line. Models are available with gross vehicle ratings of 24,000 pounds and up, and combination weights of 50,000 pounds and up.

Power is supplied by new V-8 engines of 401, 461, and 549 cubic-inch displacement, with horsepower ratings of 206, 226, and 257 each. **(International Harvester Co., 180 N. Michigan Ave., Chicago 1, Illinois, U.S.A.)**

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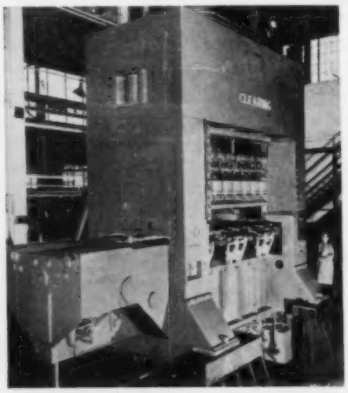

Multi-Purpose Presses

Multi-purpose automatic presses offer a manufacturer equipment that will continue to remain useful in spite of design changes in his products. The Transflex presses are not single purpose machines. Rather, they are designed to be used to produce a number of different parts, and to be changed over from one job to another.

The flexibility of Transflex presses is obtained by making those features of the press that may be changed adjustable. The automatic feed that carries the part through the press has been designed so that the feed stroke is adjustable. Feed fingers may be changed to grip parts of different dimensions. Die cushions are mounted on a track within the press bed and can be moved laterally. **(Clearing Machine Corp., 6499 W. 65th St., Chicago, Illinois, U.S.A.)**

Plastic Body For Refrigerator Trucks

The sides and top of this Frigid-Van are made of a one-piece plastic molding. They are attached to a matching, one-piece plastic floor. No cool air escapes from the truck and there are no metal parts to conduct heat to the outside. There are no supporting structures inside the truck and the bodies require only about half the insulation thickness of conventional refrigerated trucks. The foam insulation doesn't pick up moisture. Corrosion is eliminated. **(Heil Co., Milwaukee 1, Wisconsin, U.S.A.)**

Electronic Thinker Fits Desk Space

Smaller than an average desk, a new electronic computer has the memory capacity and problem-solving ability of larger machines. The computer can add, subtract, multiply, divide and make decisions as instructed by internally stored programs. It operates from a standard 115 volt, 60-cycle outlet. An engineer with a knowledge of computing techniques can learn to operate it in as little as 30 minutes, the non-computer-schooled engineer in 3 days. **(Librascope Inc., 808 Western Ave., Glendale, California, U.S.A.)**

executive for

...OVERSEAS

business development

Large, internationally known engineering and construction firm has excellent opportunity for executive with proven record in business development in South America. Would work initially out of firm's Home Office ultimately opening branch office in South America.

Applicant should have at least 10 years' experience in engineering and construction; a good knowledge of the production, sales and fiscal aspects of the business; intimate understanding of contracts; and COMMAND OF SPANISH LANGUAGE.

Must have the ability and a past record of dealing with top people in government and private industry in developing large contracts. This executive will have the opportunity to build a business in South America to whatever size and extent capable and to administer the area operation.

Write:

P-2141, Management Digest

1125 W. 6 St., Los Angeles 17, Calif.

Packaged Air Conditioner

This 5-ton air conditioner can be installed as a window unit or against an outside wall. It is quiet, and flexible enough to be used in any office or multiple story building.

The machines come in one package completely assembled, charged and wired up. They can be utilized to provide year around comfort with a heat pump. A 3-ton capacity machine is available also. **(The General Air Conditioning Corp., Los Angeles 23, California, U.S.A.)**

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Shawinigan's *Acetic Acid* is manufactured to meet the highest standards of the textile industry. It is a chemical vital to the production of consistently-fine cellulose rayon and to the colorful dyeing and printing of fabrics.

Shawinigan Chemicals Limited, one of the world's large producers of *Acetic Acid*, supplies this product to textile fabricators and other users in many countries throughout the world. These users have learned from past experience that a better product always results when only the finest chemicals and raw materials are used in its manufacture. That's why Shawinigan's *Acetic Acid* and its entire range of fine organic chemicals are designed to assure only top quality wherever and whenever they are used.

- Manufacture of cellulose acetate which is used in the production of lacquers, plastics and photographic films.
- Starting material in the manufacture of acetic esters used as lacquer solvents and plasticizers.
- Metallic salts of acetic acid as mordants in the dyeing industry.
- Raw materials in the manufacture of dyes and pharmaceuticals.
- Coagulating agent for rubber latex.
- Leather tanning.
- Commercial pickling.

For full information regarding your needs please write:

SHAWINIGAN CHEMICALS LIMITED

Shawinigan Building, Montreal, Quebec, Canada.

Electrically-Driven Stapler

Office papers are quickly and economically stapled with a new, electrically-driven stapler. The Bostomatic drives staples automatically when papers are inserted against a combination back gage and switch release. The back gage can be set up to any depth up to 4¼ inches, and will staple from 2 to 32 sheets of 2-pound mimeograph paper.

The Bostomatic's cast metal base and cover provide weight for stability and durability, and a full-size rubber base keeps the machine steady. The stapler can operate continuously without overheating. **(Bostitch, Inc., 419 Mechanic St., Westerly, Rhode Island, U.S.A.)**

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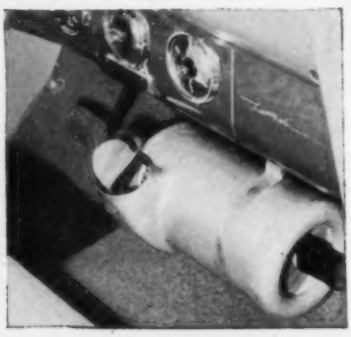

Auto Air Conditioner

An air conditioner unit for motor vehicles comes in kit form for installation by the buyer. It will fit most trucks, autos, and station wagons made since 1951. Working on freon gas, it weighs 85 pounds; the manufacturer says you need no special experience to install it. **(Kool Engineering Corp., 3716 Belmont Ave., Chicago 18, Illinois, U.S.A.)**

YOUR MANAGEMENT READING

Management Digest's editorial staff here again does the "worthwhile reading" for you to save your time. For the following literature, please write on your company letterhead directly to the address given, mentioning Management Digest.

All About Aluminum—"Aluminum Castings Handbook" discusses sand, permanent-mold, and die casting; also explains various pig and ingot classifications, alloying elements, and alloy characteristics. Another Reynolds publication is "The Aluminum Digest," covering new developments in production and fabricating methods, new products and markets. (Reynolds Metals Co., 2500 S. Third St., Louisville 1, Kentucky) . . . "Aluminum Paint and Powder" describes the manufacturing properties and application of aluminum paints, as well as aluminum in printing and other uses. Price: $4.50. (Reinhold Publishing Corp., 430 Park Avenue, New York 22, N. Y.) . . . "Properties of Aluminium and Its Alloys" contains complete information about British aluminum alloys. Price: about 7/2, or $1.00. (Aluminium Development Association, 33 Grosvenor St., London W.1, England.)

Portable Power Tools—The Skil Corporation's 1956 catalog lists more than 100 models of industrial portable power tools and accessories. It details application and performance of radial saws, drills, sanders, grinders, refacers. (Skil Corporation, 5033 Elston Avenue, Chicago 30, Illinois.)

Packaging Efficiency—Packaging Series 47 will help you improve your packaging operations. "Automation" of the packaging process, machinery maintenance, research and simplification are some of the subjects covered. Price: $1.75. (American Management Association, 1515 Broadway, New York 36, N. Y.)

Personnel Management explains how to install and maintain a program of job evaluation, how the program should be carried out, and who should be responsible for its execution. Price: $6.00. (McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y.)

Plant Operators' Manual—Anyone responsible for the operation and maintenance of power equipment will find this book a valuable addition to a management library. Covers boilers, steam engines, turbines, diesel engines, pumps and compressors. Price: $5.00. (McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y.)

Golden Book of Management describes the special contributions, publications, careers and personal characteristics of 70 men from 11 countries (see page 19) who have made contributions to the development of management as a science and art. Price: $4.90 or £1. 15s. (Newman Neame, Ltd., 71 Blandford St., London W.1, England.)

Sales Promotion and Merchandising—A new Printers' Ink publication, "Check Lists of Sales Promotion and Merchandising Essentials," covers market research, new products, displays, dealer support and many other marketing ideas. Special bookshelf offer includes book mentioned above, as well as "Check Lists of Advertising Essentials" and "Check Lists of Sales Essentials." Price: $4.95 each; all 3 for $11.95. (Printers' Ink Books, 42 Memorial Plaza, Pleasantville, N. Y.)

Overhead Traveling Cranes—A handbook covering latest developments in crane manufacture, classification of cranes, runways, electrical equipment, accessories. (Dominion Bridge Co., Ltd., Lachine, Quebec, Canada.)

The Publisher Says . . .

Please forgive me if I sound a trifle immodest this month. I would like to report to you, an important member of the MANAGEMENT DIGEST family of readers, on the progress the magazine is making.

With this issue, we complete a year of publishing under our new title, and with our new format. It was in September 1955 that we changed to the name MANAGEMENT DIGEST. Our research had convinced us that these changes answered a need shared by businessmen everywhere.

In the past 12 months, your response has encouraged us to believe that we have been more successful than ever in meeting your needs for an interesting, readable, and useful magazine. The circulation of MANAGEMENT DIGEST is at an all-time high, and growing at the fastest rate in its history. In May, we set a new record for new subscribers. In June, we immediately broke that record.

More of you are writing to tell us about the magazine, to make suggestions, and mention subjects that interest you. We hope you will continue to write to us. This helps us publish a more useful magazine for you. It is, after all, your magazine. MANAGEMENT DIGEST is the *only* international magazine *wholly* devoted to subjects of interest to men in management positions throughout the world.

Thank you for your continued interest and help.

—Charles S. Mill (Publisher)

Publications Digested

McGraw-Hill Publishing Co., Inc.
330 W. 42nd St., New York 36, N. Y.

American Letter
American Machinist
Aviation Week
Business Education World
Business Week
Bus Transportation
Chemical Engineering
Chemical Week
Coal Age
Construction Methods & Equipment
Control Engineering
Electrical Construction & Maintenance
Electrical Merchandising
Electrical West
Electrical Wholesaling
Electrical World
Electronics
Engineering & Mining Journal
E&MJ Metal & Mineral Markets
Engineering News-Record
Factory Management & Maintenance
Fleet Owner
Food Engineering
Industrial Distribution
Ingeniería Internacional Construccion
Ingeniería Internacional Industria
Metalworking Production (London)
National Petroleum News
Nucleonics
Petroleum Processing
Petroleum Week
Power
Product Engineering
Textile World
The American Automobile
Today's Secretary

Advertising Publications, Inc.
200 E. Illinois St., Chicago 11, Ill.
Industrial Marketing

American Bankers Association
12 E. 36th St., New York 16, N. Y.
Banking

American Management Association
1515 Broadway, New York 36, N. Y.
The Management Review, Personnel Supervisory Management

American Society for Metals
7301 Euclid Ave., Cleveland 3, Ohio
Metal Progress

Bill Brothers Publishing Corp.
386 Fourth Ave., New York 16, N. Y.
Sales Management

Breskin Publications
575 Madison Ave., New York 22, N. Y.
Modern Packaging *Modern Plastics*

Business Publications Ltd.
Mercury House, 109-119 Waterloo Road, London, S. E. 1
Business

Dartnell Publications, Inc.
4660 Ravenswood Ave., Chicago 40, Ill.
American Business

F. W. Dodge Corp.
191 W. 40th St., New York 18, N. Y.
Architectural Record

The Economist Newspaper, Ltd.
22 Ryder St., London S.W. 1, England
The Economist (London)

Fritz Publications, Inc.
431 S. Dearborn St., Chicago 5, Ill.
The Paper Industry

Harvard University
Soldiers Field, Boston 63, Mass.
Harvard Business Review

Industrial Publications, Inc.
5 South Wabash Ave., Chicago 3, Ill.
Ceramic Industry

Keeney Publishing Co.
6 N. Michigan Ave., Chicago 2, Ill.
Heating, Piping & Air Conditioning

Petroleum Press Service
91 & 93, Bishopsgate, London E.C.2, England
Petroleum Press Service

Petroleum Publishing Co.
211 S. Cheyenne Ave., Tulsa 1, Okla.
The Oil and Gas Journal

Printers' Ink Publishing Co., Inc.
205 E. 42nd St., New York 17, N. Y.
Printers' Ink

Rubber and Technical Press, Ltd.
147 Grosvenor Rd., Westminster, London, S.W. 1, England
The Rubber and Plastics Age

Simmons-Boardman Publishing Corp.
30 Church St., New York 17, N. Y.
American Builder, Marine Engineering, Railway Age, Railway Track and Structures, Railway Locomotive and Cars, Railway Signaling & Communications

Temple Press Ltd.
Bowling Green Lane, London E. C. 1
Plastics, The British Motor Ship

The Times Publishing Co., Ltd.
Printing House Square, London, E. C. 4
The Times Review of Industry

Welding Engineer Publications, Inc.
12 East Grand Ave., Chicago 11, Ill.
Welding Engineer

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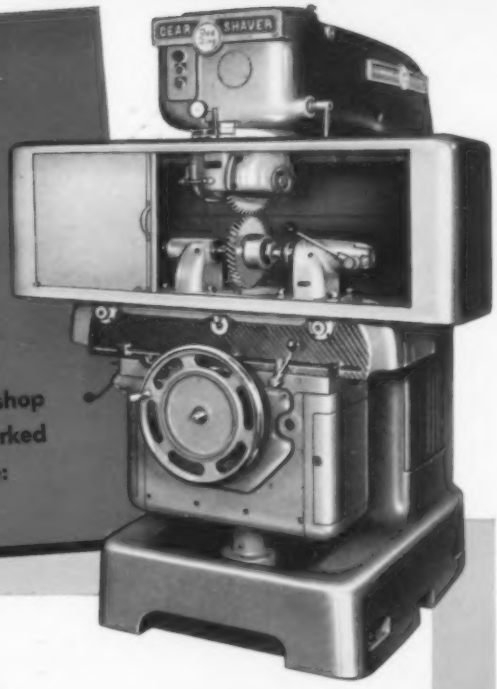
This index is a service to readers. Every effort is made to maintain its accuracy, but MANAGEMENT DIGEST assumes no responsibility for errors or omissions.

The RED RING ALL-PURPOSE GEAR SHAVING MACHINE

The Red Ring Model GCI is the ideal job shop gear shaving machine because of its marked versatility. With this machine you can shave:



SPUR AND HELICAL GEARS TO 18" PD

INTERNALS TO 18" PD

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CLUSTER GEARS

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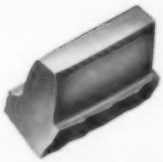

STRAIGHT AND CROWNED TEETH

For high production work the GCI may be equipped with the Red Ring Automatic Differential Up and Down Feed, the Automatic Splash Guard Door and the Air Operated Tailstock to provide semi-automatic operation.

Bulletin 549-4 gives complete information and specifications. Write for it today.

SPUR AND HELICAL GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORM

NATIONAL BROACH AND MACHINE CO.

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7282

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High-speed, high-powered earthmover relies on lifelines of Bundy Tubing

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Industrial designers the world over find new uses for Bundyweld daily, turn to Bundy® for specialized engineering assistance in both fluid transmission and purely mechanical applications. If you have a tubing problem where high strength, flexibility, lightness, and cost-savings are important, write or cable today!

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Detroit 14, Michigan, U.S.A.

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- Leakproof
- High thermal conductivity
- High bursting point
- High endurance limit
- Extra-strong
- Ductile
- Lightweight
- Machines easily
- Takes plastic coating
- Takes plating
- Shock-resistant
- No inside bead
- Uniform I.D., O.D.